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EXTINCTION: ITS CAUSES AND RESULTS

By James A. Peters

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The phenomenon of extinction occupies a rather unusual position in the minds of biologists in general, in that it is recognized by all as widespread and common in its occurrence, and therefore not worthy of a great deal of serious thought. It is quickly dismissed in most university courses with the briefest of discussion, if touched upon at all. The causes of extinction are usually emphasized; the effects are generally ignored. It is hoped that this article will serve in the correlation and crystallization of thoughts concerning this phenomenon.

It is of primary importance to adequately define several of the terms to be used. The two terms "extinction" and "extermination" have been used interchangeably, although the first is a statement of a condition or status, while the second is a dynamic act or process. Extermination may bring about extinction, and usually does, but extinction in a species may be brought about by means other than active annihilation. In the remainder of this article extinction will be used to mean that a group is no longer living or active, that is, without a survivor in all or part of its range; and extermination will be used only in the sense of destruction, annihilation, or eradication of a group, with the resulting extinction of the group. In short, extermination is always active, extinction may be either active or passive.

Extinction may be considered to be of two types. The first, and most common usage of the term, is the total disappearance of a group, the blotting out of the line. The second type is the disappearance of the ancestral form as the result of the evolution of a new and different form through variation and mutation. The first is generally abrupt (geologically speaking) and final, the second is timeless and fluid. In the second, although the *forma typica* is gone, it still has its survivors, in that its germ plasm still is being handed down to successive generations. The first is the death of a group; the second is primarily the death of an individual. We will be concerned with the first of the two, as the second is essentially the result of speciation and differentiation. However, it is obvious that a discussion of the first will include many facts pertaining to the second, and should be applied to it.

The causes of extinction are many and varied, and a multitude of authors have catalogued and classified them. To my mind, however, there is one basic fact which exists in the extinction of any group. No cause or causes can bring about the extinction of a form unless the number of new individuals produced by its members is smaller, either abruptly or successively, than the preceding aggregate of individuals. All causes or reasons eventually arrive at this fundamental point.

Any cause must produce this effect, or the form is not affected adversely. For example, decrease in moisture available in an area leads to deforestation. Since a forest can support only a limited number of animals, any decrease in its size leads to a decrease in the population inhabiting it, and consequently a sharp reduction in the total number of offspring produced. Thus the cause has led back to the fundamental rule stated above.

As a corollary of this law, one might add that a weakness in any single point of the life cycle of an animal serves as a focal point for the wedge of extinction to enter. The small mammals of the age of the dinosaurs could never harm the full grown *Tyrannosaurus*, but the defenseless egg of the huge beast quite possibly served as welcome food for many of them. Cowles (4, 5, 6,) suggested that the dinosaur (archeosaur) extinction may have been the result of very slight increases in temperature which resulted in sterilization through the death of the germ plasm. In this case inability to fertilize the egg is the weak point in the life cycle.

Colbert and Bogert (3, p. 372) disagree with Cowles, and state that "... extinction is ... hardly to be explained by changes in temperature alone. Other factors, such as changes in food supply ... (etc.) ... must be taken into account." This is the much debated question of a multiplicity of factors against a single one. If one considers this from the point of view that no one thing can change or be changed without changes occurring in every other thing *ad infinitum* (the law of cause and effect), he cannot but agree with Colbert and Bogert, for the interdigitation of all things is undeniable. However, if one considers it from the basis of Leibig's law of the minimum, which states "The determining factor in the limitation of the distribution of the species is that which is present in minimum amount" (2, p. 157), and rephrases it to fit extinction, he can readily agree with Cowles. Thus: "The determining factor in the extinction of a species is that which falls outside the limits of toleration of the species." This single factor, be it the slight increase of temperature which destroyed the germ plasm of a dinosaur, or the change in moisture which destroyed the titanothere's rough grasses, is the one which starts the species on the road to extinction. A multiplicity of factors may fall in line immediately thereafter and hasten the final extinction, but the single factor has served to tip the balance. It seems plausible that there is invariably one factor which can be selected as the principal instrument in the demise of an individual or species. It is perhaps superfluous to point out that single factors can and do vary between individuals and species; what is highly important in one case is negligible in another.

CAUSES

The causes of extinction have been broadly classified by Osborn (13) in two groups, external and internal. The difference between them is most notable in their results. External causes are usually discontinuous and local in their effect, internal causes are continuous over the range of the species, for they are common to all individuals.

The external causes can be considered the results of the environment, which is defined (2, p. 97) as "the resultant of all the external conditions which act upon an organism." Mathematically, the resultant is the sum of all corresponding vectors, and can be of either a positive or negative value, with respect to a point. If we permit the same definition in biology, then we can state that as the value of the environment (= resultant) varies, so varies the well-being of a species. As soon as this resultant becomes negative, the species has started down the road to extinction. I might add that, in biology just as in mathematics, any single vector can be of sufficient magnitude to produce the negative result by itself.

The environment may be further subdivided into two phases, the physical and the biotic. All changes in land masses, configuration, rainfall, temperature, and associated phenomena are manifestations of the physical processes of the earth and its parts. The uplift of the Rocky Mountain chain and the resultant drying out of the area to the east had a serious effect on the forms adapted for life in the moist forests previously existing there. Practically all of the physical phenomena which we commonly consider as causes of extinction, however, are such only because of the changes they create in other factors, such as the rainfall or the biota. Exceptions to this would be volcanic action, when the dust or lava flow is the immediate cause of death through asphyxiation or burning; floods; quicksand; and other violently destructive phenomena, such as hurricanes, tornados, tidal waves, and so on. Climatic changes, on the other hand, play an outstanding role in extinction. Very slight changes in temperature are sufficient to produce sterility in certain lizards (7) and, as mentioned above, Cowles feels this was a significant factor in the extinction of the dinosaurs. A slight change in precipitation annually was all that was necessary to change the type of grass on the Great Plains from a browsing animal's food to that of a grazer, and the subsequent disappearance of the browsers from that area is directly traceable to that fact. Perhaps the difficulty in selecting a single factor in most cases arises from our inability to weight each properly, and our scant knowledge of the extent of damage done by each. The fact remains, however, that the climate and its variations plays a very important and direct part in the life and death of every animal and its species.

The biotic environment is perhaps the most striking of all the causes of extinction, although possibly not the most important. Violent death is the "natural" death of most animals, and takes place continuously in a myriad of ways. There is a constant, eternal struggle between individuals and species for survival, and the list of competitors is changing incessantly, with the old defeated warriors stepping down and new contestants picking up the gauntlet. To lose in this competition means extinction, immediately for an individual, eventually for a species.

The constant change of the flora of an area is often accompanied by corresponding changes in the fauna. An ecological succession is nothing more than a series of extinctions on a small scale, in which the most successful, dominant forms constitute the climax. The insects associated with and dependent upon willows and box elders disappear from an area when those trees are replaced by oak-hickory woods, and these insects can be considered extinct in that area. The flora may also bring about extinction by the disappearance of cover types, by being mechanically dangerous, or by the presence of poisonous species. The latter become a factor only when some other adverse condition forces the animals to feed upon plants to which they are not accustomed. Poisonous plants are usually known and avoided by animals within their normal range. This factor is important only after some other factor has already caused an upset in the regimen of a beast.

The influence of the fauna of an area upon extinction of members of that fauna is far-reaching. This is an active extinction, and is properly termed an extermination in most cases. The mongoose, when brought into the West Indian islands, immediately wiped out enormous numbers of the indigenous forms. Extermination of this kind is almost invariably the result of action of one species against another, man being one of the few animal species which practices intraspecific destruction. There are others, such as the female black widow spider, who devours her mate after successful fertilization, or the salamander *(Salamandra atra)* which produces only two young in a brood, due to intra-uterine competition between the embryos, and the death of all but one in each duct (8, p. 2-3). Whether habits such as these actually lead to extinction of a species is not known, but it seems a legitimate possibility. Man, of course, is well on his way toward self-extinction. The more usual methods of extinction by the fauna of an area are through insects and infection; parasites and their accompanying epidemics; competition between groups and individuals; reduction in total availability of a food supply (particularly in the case of monophagous animals, such as the anteater), introduction to or invasion of an area by competitive forms (such as the mongoose), and last, wholesale destruction by the most efficient exterminator of the faunal group, man. Man has probably brought about the extinction of more forms in less time than any other natural cause. His methods are more thorough, his techniques more refined and his results more devastating. Oddly enough, he is the only animal which has attempted to maintain the status quo and to halt extermination through legislation and administration. That such attempts are predestined to fail is clear, for it is futile to try to hold the processes of evolution to the letter of the law. Man's destruction of species other than his own is a natural consequence of his evolution, and, while he may hinder the destruction he can never halt it, except through complete self-extermination, which, after all, would only be another of the natural consequences. Undoubtedly the titanotheres, had they been able, would have loudly objected to their extinction as a result of the development of teeth unsuited to the diet available, just as man objects to his plainly visible end in the future. The objection would not have saved the titanothere, however, nor is it likely to save our, in many ways highly overspecialized, species.

The internal causes of extinction are of a different denomination than those discussed above. They are part and parcel of the animal itself. They arise from failure of the species to become accustomed to the changes taking place around it, in short, the inadaptability of the species.

If an animal ceases to vary, that is, if it reaches a genetic fixity of character, it is quite likely to become extinct in a short time. The constantly changing conditions in which it must live demand a similar change in the animal. Abel (in 14, p. 886) suggests that this cessation of variation is closely related to the senescence of a species, which is a tacit assumption that a species is formed, undergoes a life cycle, reaches old age and senility, and finally dies, just as does an individual. This idea, while certainly possible, is not well proven, and is refuted in several cases. Members of the Radiolaria (Protozoa) still living today are specifically indistinct from fossilized forms in the oldest known limestone and other fossil deposits. This might merely indicate that some species are longer lived and more hardy than others, just as with individuals, both inter- and intra-specific. Whether this be so or not, cessation of variability is still a definable factor in extinction.

An animal which is overspecialized is well on its way to extinction. This usually results from a start along a definite line of variation which is in the beginning highly beneficial to a species with continuation along that line until the variation goes beyond the point of usefulness and becomes a hindrance. This may be due to a change in the environment which renders the adaptation no longer useful. Retrogressive adaptation, the return to the primitive, does not occur. A part lost is lost forever. According to Loomis (10), overspecialization is due to "momentum." He states "A variation started along any line tends to carry that line of development to its ultimate, being driven by momentum." If the ultimate proves to be detrimental to the animal, its species dies out.

When the death rate of a species exceeds its birth rate, extinction rapidly follows. This might be a result of a long gestation period, for example. The longer the young are carried by the mother the greater becomes the possibility she will be killed while carrying them. Directly correlated with this is the amount of parental care needed by the young after birth. Altricial offspring, dependent upon the parents for protection, suffer a much greater mortality rate than precocial young, capable of caring for themselves within a few hours or days.

The failure of a single organ or part to adapt itself to a change can easily be sufficient to cause the death of a race. As pointed out by Osborn (14), the teeth of the titanotheres could not change to meet the new conditions of food supply on the Great Plains, and, in his opinion, this one fact led to their extinction.

RESULTS

The primary result of extinction, to my mind, is the absence of the extinct species. Once a form is gone, it is seen no more. Its departure is permanent. The totality of its disappearance and the rapidity with which it is forgotten is a mirror of the ephemeral quality of life itself, in the infinite vastness of time and space.

Another important result of extinction is that pointed out by Matthew (11) when he explains the distribution of animals on the earth. The discontinuous distribution of most of the larger categories in our system of classification, such as the Carnivora, can be explained by assuming the earlier existence of closely related or identical forms with a continuous distribution throughout the intervening area which have undergone a subsequent extinction. A change in climate or physiography on one continent is sufficient for extinction of a taxon there, although it survives elsewhere in its range where conditions remain at an optimum.

Relict species are a direct result of the extinction of a group. These forms have been rather poetically defined as "the sole survivors of a vanishing race." They are generally endemic in their ranges, surrounded by some barrier which provides a measure of protection for the form. They are usually primitive, and have survived only because there is no competition with more capable forms in the restricted range. The Rhynchocephalian *Sphenodon* is the only remaining species of a once large order of reptiles, and is now restricted in its range to several small islands off the coast of New Zealand, where it is able to survive due to the lack of predators and the protection of the New Zealand government.

The extinction of a species opens up the niche which that species has occupied in the community for the use of some new species. It provides room for the expansion of surviving forms. The disappearance of the large reptiles provided the opportunity for the smaller but more capable mammals to enter upon their fullest period of development. The preemptor of a niche is usually stronger than the previous occupant, and this superior strength may lead to the extinction of the old form. This is not necessary for the vacating of a niche, however, as this can be produced by any of the causes listed in this article. It is a firm principle of evolution that the death of one form will permit the development of another to take its place. This new form usually arises from a more primitive ancestor which is capable of adapting itself to the new conditions.

When a species becomes extinct, the whole community in which it lived is forced to rearrange. Animals which used the extinct species as a food supply must find a new source of sustenance or follow it into oblivion. In the Arctic, the abundance of the wolf and fox follows that of the Arctic hare, reaching a peak shortly after that of the hare, and subsiding as the hare supply is depleted. This is usually not a complete extinction, but could easily become such. Animals which an extinct species preyed upon now have an opportunity to increase their numbers and range, and often do so. If the extinct form was a herbivore, other herbivores find themselves with a larger food supply, and tend to multiply in numbers. In short, the plants or animals on which an extinct form fed have an increased opportunity for survival. This is a lasting and very important result of extinction, and is felt by all members of the community.

In conclusion, I would like to add the classic statement of Colbert, Cowles and Bogert (3). They say "Reviewing the evidence in whole, it seems that animal extinctions are very complex phenomena, and it is probable that they are caused by the interaction of numerous factors; consequently they are not understood, and it is possible that they will never be understood. We are continually baffled by questions that defy explanation." We do not know very much about extinction, what we know we are not entirely sure of, and what we think we are sure of quite often turns out to be wrong!

REFERENCES

1. ANDREWS, C. W., "Some Suggestions on Extinction," Geol. Mag., Vol. 10, No. 463, 1903, pp. 1-2.
2. CARPENTER, J. R., "An Ecological Glossary," Univ. of Okla. Press, Norman, Okla., 1938, pp. 1-306.
3. COLBERT, E. H., COWLES, R. B., and BOGERT, C. M., "Temperature Tolerances in the American Alligator and Their Bearing on the Habits, Evolution, and Extinction of the Dinosaurs," Bull. Amer. Mus. Nat. Hist., Vol. 86, No. 7, 1946, pp. 333-373, pls. 36-41.
4. COWLES, R. B., "Possible Implications of Reptilian Thermal Tolerance," Science, Vol. 90, 1939, pp. 465-466.
5. ...., "Heat-induced Sterility and its Possible Bearing on Evolu-

tion," American Naturalist, vol. LXXIX, March-April, 1945, pp. 160-175.

6. ______, "Surface-mass Ratio, Paleoclimate and Heat Sterility," American Naturalist, Vol. LXXIX, November-December, 1945, pp. 561-567.
7. COWLES, R. B. and BURLESON, G. L., "The Sterilizing Effect of High Temperature on the Male Germ-plasm of the Yucca Night Lizard, *Xantusia vigilis*," American Naturalist, Vol. LXXIX, September-October, 1945, pp. 417-435.
8. FRANCIS, E. T. B., "The Anatomy of the Salamander," Clarendon Press, Oxford, 1934, pp. i-xxxi, 1-381, pls.
9. HUTCHINSON, H. N., "Extinct Monsters," London, 1910, pp. 1-329.
10. LOOMIS, F. B., "Momentum in Variation," American Naturalist, Vol. 39, no. 467, 1905, pp. 839-843.
11. MATTHEW, W. D., "Climate and Evolution," Spec. Publ. New York Acad. Sci. no. 1, 1939, pp. 1-223.
12. MORRIS, C., "The Extinction of Species," Proc. Acad. Nat. Sci., Philadelphia, vol. 47, 1895, pp. 253-263.
13. OSBORN, H. F., "The Causes of Extinction of Mammalia," American Naturalist, vol. 40, 1906, pp. 769-795 and 829-859.
14. ______, "The Titanotheres of Ancient Wyoming, Dakota, and Nebraska," United States Geol. Survey Monograph no. 55, Vol. 2, 1929, pp. 852-887.
15. PACKARD, A. S., "Geological Extinction and Some of its Apparent Causes," American Naturalist, vol. 20, no. 1, 1886, pp. 28-40.

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Place of the Sciences In the Humanities

To write about the importance of humanities for students specializing in science might seem to imply acceptance of the long-prevalent distinction between the sciences and the humanities. On the contrary, I think that the distinction can be based only upon misconception of purposes and practices in good teaching of science. It is my strong personal conviction that sciences take high rank among the humanities. Furthermore, assuming that all who try to think on the problems of life need proper perspective, I see no essential difference between the value of education in other humanities for chemist or biologist and the need for training in the sciences for lawyer or poet . . .

Presumably each individual must entertain his own conception of what are the "humanities." At least, however, one need make no apology for assuming that the natural sciences are aptly described as "belonging to an advanced culture." Perhaps they are even "conducive to culture." I do not know what could constitute the "humanities," if there must be excluded any of those disciplines that have to do with the relation of man to his fellows of the past, the present and the future; any of those that have contributed in time gone by, and vigorously contribute even now, to the liberation of the human mind from ignorance, prejudice, and abject slavery to tradition; any of those that drive men toward independence of thought with full recognition of the limitations of the mind of the individual in its grasp of the whole; any of those that prompt and partially equip the mind of man to reach toward its highest possibilities of intellectual attainment. If, on the other hand, such disciplines as contribute toward these great ends do form a proper part of the humanities, then the natural sciences must take high rank . . .

It has sometimes been said that science is concerned with facts, the humanities with values. The validity of such a distinction could rest only upon the assumption that, among the values, we are not to count understanding of the world in which we live, promotion of human adjustment to that world, and appreciation of the beauty of growing generalizations concerning protoplasm, development, speciation, electrons, and star galaxies; that we are not to recognize among the values, the development of the imagination or the freedom of the mind and spirit.—Prof. R. E. Coker (U. of N. C.), in A *State University Surveys the Humanities*.

THE GIANT SNAILS

By Albert R. Mead *

A giant African snail has broken loose from its native habitat and is now on the rampage. It has devastated parts of Hawaii and the Orient and within recent months has made its stealthy appearance in California, having been brought back on salvaged war material. Albert R. Mead *of the Zoology Department of the University of Arizona began investigating the giant snail in British West Africa in 1944: he is leading the campaign for state and Federal quarantine laws with which to protect our crops from this ruthless invader.*

1

Who said snails are slow? About one hundred years ago, a giant African land snail began heading for the far corners of the earth. Wherever it traveled, destruction went with it. During the war in the Pacific it accelerated its speed in jumps that have landed it right here in the United States. Millions upon millions of dollars of damage has been left in its path. Lush tropical vegetable gardens have been stripped of their leaves and flowers, and even the more tender pieces of bark. *Our* gardens and crops are next on the menu unless the invader can be stopped.

The giant African snails are six inches long and as big around as an orange. They have the unromantic name of *Achatina fulica* but their appearance is attractive; every shell presents a little different combination of soft greens, purples, pinks, and browns with frequently interspersed snow white. They have no difficulty in feeding themselves; they will eat almost anything (and everything) you happen to have in your garden, and they stay around until all the food is gone. They live for several years, and when it comes to multiplying they make the proverbial rabbit look like a piker.

The trouble is that these snails are now on their way to your *garden — en masse.*

As far as we know, they staked out their original land claim all along the east coast of Africa from Natal and Mozambique in the south to Kenya and Italian Somaliland in the north. But apparently because they have not much of a hankering for altitude, they were stopped in their northern incursion by the mountainous country of Ethiopia.

In this wide African playground they were neither abundant nor rare. Like most animals in natural conditions, they had reached an equilibrium with other members of their environment. The African natives, who say they are good to eat, have known of these snails since earliest times and have made good use of both their shells and their carcasses. Highly prized as human food, they are usually dropped alive into boiling water, removed from the shell, cleaned, chopped, and included in all sorts of native food concoctions—from soup to a thick starchy, oily mush.

The larger shells are used as containers for salt, oil, or sauces, and as drinking cups. Sometimes they are cut into strips and made into spoon-like utensils. In some African tribes the wayward child who persists in wandering away has a noisy string of smaller shells tied around his wrist, waist, or ankle — à la cow. In other tribes the wearing of these shells is believed to endow the owner with especial immunity to certain types of evil forces (whatever they are).

In many parts of Africa, including much of the West Coast, tiny sequin-

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like disks are cut out of the shells by fond grandmothers. These are strung by the thousands to form from one to several strands around the hips of the younger women. In parts of the Gold Coast and Nigeria, I often saw these worn as the sole item of apparel.

The earliest reliable records of *Achatina fulica* place it on Mauritius — a tiny island between Madagascar and India. So far as we know, the snail's first big move did not occur until 1847. In that year a British collector and traveler, W. H. Benson, visited his good friend Sir David Barclay, also an amateur collector, on Mauritius. There he saw *Achatina fulica* crawling all over Sir David's gardens.

Benson decided to take some of these snails with him to India, and in April he let them loose in the Chouringhie Gardens, near Calcutta. A few months later, after his return to England, he learned that they were multiplying and spreading to a great extent. He also learned that the Indians were not taking to them at all as a possible delicacy.

The snail's next stop was the island of Ceylon, where it was introduced about 1900. It was there that its potentialities as an agricultural pest were first convincingly demonstrated. To add insult to injury, the lack of lime in the soil prompted these snails to rasp off, with their file-like tongues, the lime from the native houses!

By 1911 the snails had reached Singapore, Malaya, and by 1928 they had spread south to Sarawak, Borneo, where in three years they became such a pest that a bounty was placed on both the snails and their eggs. Within two weeks, approximately half a million snails and twenty million eggs were collected and destroyed. But a few weeks later the snails were as numerous as before. Still further south, in Sumatra and Java, the snail made its presence known in 1933, when its appetite for young rubber plants gave it an even blacker name.

From Singapore it spread north to Amoy, China, in 1931 and across the straits to the Japanese-controlled Formosa two years later. Probably sometime in 1937 it was introduced into Hong Kong, and by 1941 its population numbered "untold millions." In 1947, over five tons of snails were collected in just four small localities in that region, but with no appreciable effect upon their rapid spread.

The Japanese people of Formosa welcomed these snails not only as an exotic item of food but as a new medicine of supposed unusual qualities. This fact undoubtedly explains the frequent introduction of the snail into the Japanese mainland since 1936. The severe winters there, however, may have helped to prevent its rapid establishment.

A Hawaiian on the island of Maui received through the mails in November, 1936, eight specimens of *Achatina fulica* sent by his Japanese relatives. The Japanese had found them a self-perpetuating delicacy and a medicine. Why not send them to Hawaii? There was no law against it.

The recipient hoped to raise them and sell them at a good price in Hawaii. And this he did for a year and a half, until one of his buyers unwittingly exposed the whole mess. The specimens were brought to the late Dr. C. Montague Cooke, Jr., the eminent malacologist or snail specialist of the Bernice P. Bishop Museum, who immediately identified them as the dread giant African snail.

Things moved fast after that. The agricultural authorities destroyed these samples and went hotfoot to the snail raiser on Maui. They found that his original eight specimens had already produced nearly 1500 large snails and countless smaller ones, to say nothing of the 425 that the grower confessed having consumed himself! Efforts were quickly made to destroy every specimen.

But there were complicating factors. A Hawaiian woman visiting in Formosa, in that same fateful year of 1936, out of sheer female curiosity decided to take a couple of these giant snails back home to her garden in Honolulu. She carried them in her grip and did not declare them. And the anxious authorities in their search for other possible populations of these snails really hit the jackpot on Oahu. They soon realized that the snail population of this island had gotten completely out of control.

On Maui, in the meantime, the snails had broken out anew with the uncontrollability of a forest fire whipped by a dry south wind. School children were enlisted to gather the snails and eggs and spot new populations. The authorities tried covering all the vegetation in the infested and adjacent areas with the very poisonous sodium arsenite spray; they tried baits containing metaldehyde; they tried appealing to the snail's appetite for lime by painting rocks, fence posts, tree trunks, and the like with a mixture of cement, calcium arsenite, and lime.

These methods and others were used in every conceivable combination for ten years at a cost of $120,000. But at this very moment the snails are still abundant and greatly increasing in numbers. Dr. C. E. Pemberton of the Hawaiian Sugar Planters' Association recently said, "We have finally realized that eradication is impossible without the expenditure of vastly more money than the Territory can afford." The only thing that has effected any measure of control has been the judicious, speedy enactment of laws making it punishable to possess or transport these snails. They have thus been successfully restricted to the two islands of Maui and Oahu.

The worst invasion of all was organized by the Japanese in the early phases of the war in the Pacific. The Japanese people had been familiar with *Achatina fulica* for several years and it was only natural that they should take it with them into captured territory. For the Japs it was a good source of "wild food" to supplement the scheduled rations or take their place in the event that supply lines were cut. The carting of this snail through the Pacific islands has already had more lasting destructive effect than the most severe scorched-earth policy. Through either the direct or the indirect efforts of the Japanese, billions of these snails are now found in the Dutch East Indies—especially New Britain, New Ireland, and New Guinea; in the Philippines; in the Bonin Islands; and in the Micronesian islands of Saipan, Tinian, Guam, Pagan, and the Palau Islands of the Caroline group.

2

No one can possibly imagine the destructive abundance of these giant snails until he has seen them. In the daytime they hang not just all over the coconut tree trunks, but one on top of the other after "standing room only" has gone. As you walk in the shade of the dense jungle growth, you crunch the young snails that litter the forest floor under your feet as though you were walking on bird's eggs. Small bushes hang thick with the diurnally resting snails. These roll to the ground like ripe fruit when the bushes are shaken. The early evening presents a more startling effect, for the flashlight reveals the snails in countless hoards actively crawling, in search for food, over every tree, rock, board, house, or other item upon which the light happens to fall. With this picture in mind, is there any wonder that there have been desperate cries for help coming in from the Pacific?

Why have these snails multiplied into such untold billions in so short a time? They have lived in East Africa for countless years and are living there now without all this display of fecundity. First of all, these snails have invaded their new territories *in the absence of their natural enemies*. What are these natural enemies? Certain lizards, beetles, ants, small carnivores, rodents, and birds occasionally will attack, kill, and consume the smaller snails and more rarely a larger individual. But it is man himself who is the greatest natural enemy of these giant snails.

Man, in the case of the Africans, the Japanese, and some Chinese, has the appetite for them; he also has the facilities for destroying them. The larger snails are protected by a heavy, china-like shell and a thick tenacious slime which is poured out all over the exposed parts of the body when the snail is irritated. These devices successfully ward off attacks from less adept aggressors. Many of the introductions in Asia were made with the intent of using the snails as poultry feed. But because the larger ones could escape the attacks, sufficient young snails have been produced to keep both the poultry fed and the snail population on the rampage.

When the young individual hatches out of its egg shell, it is recognizably a small snail with a thin, roundly pyramidal shell about as big as a pea. Before it is a year old, it becomes sexually mature, in every case, as a male. A few months later, in every case, the female tract becomes fully developed. Each individual then is a true hermaphrodite with but a single gland that produces, at the same time, both male and female sex cells.

The eggs are about the size and shape of black-eyed peas and have a very hard, smooth, canary-yellow shell. Any little depression in the soil under a rock, a board, leaves, or the like, forms an inviting repository for the eggs. Some of the individuals will retain the eggs in the uterus so long that they take only a few hours to hatch. And in some related species, they are habitually retained still longer, so that they actually hatch within the uterus. The young are then brought forth alive or "ovoviviparously" as the technically inclined prefer to express it. The protective nature of this retention within the uterus of the nearly invulnerable adult is obvious.

It is the newly hatched snail that is most vulnerable to attacks from its enemies. But with up to three hundred eggs laid in a single batch, these snails can well withstand a high mortality rate in the young. The most startling element in this whole hermaphroditic setup, though, is the fact that *every individual is an egg producer*. In fact, one scientist mathematically figured, most conservatively in every way, that in five years a single gravid individual could give rise to a possible population of nearly eleven billion snails. Their aggregate weight would amount to almost as many pounds.

There are still other factors that amply explain the great survival rate these snails enjoy. For one thing, they are not finicky about what they eat, and rival the barnyard pig in their gustatory versatility. Among the more common food items are rotting fruits and vegetation, young shoots, tender pieces of bark, humus, excrement of humans and livestock, and even stepped-on individuals of their own species for a bit of passive cannibalism.

One food item that *Achatina fulica* is absolutely dependent upon, however, is lime. It is the lack of this in the soils of West Java and Ceylon that has forced snails there to rasp off the lime from the native houses. In contrast, the coralline islands of the South Pacific have an abundance of lime, thus automatically eliminating one more factor that might otherwise limit numbers.

The snails usually feed at times when they are least apt to encounter the attentions of their enemies: at dusk, at night, in the early morning, and during the day when it is raining. At other times they secrete themselves as much as possible. If circumstances force them to remain conspicuously out in the open, they seal themselves off and cement themselves tightly to some object with the aid of a limy albuminous secretion around the aperture of the shell. This successfully keeps out any nosy would-be predators or parasites.

During a food shortage or a dry spell, they bury themselves deep in the ground and make a similar secretion over the entire aperture of the shell save for a slit permitting air to be occasionally taken into the single large lung. I kept one in this quiescent condition in the Gold Coast for nearly six months. Sprinkling the specimen with a little water persuaded it to come out and look around for food. There were no outward signs that it had undergone the rigors of such a prolonged period of suspended animation. Its huge liver had held enough stored energy to permit the snail to survive this long period of fasting. This ability to withstand adverse conditions of food and moisture helps further to explain why these snails have been carried such great distances with often considerable time consumed in transit.

3

I think we can now appreciate why the U. S. Navy was frantic when it took over the problem of trying to set things straight in some of the infested islands of the Pacific Trust Territory. In fact, the Navy's plight was so desperate that it sent in an SOS to the National Research Council with the request that something be done about these ever increasing snails. In accordance with the advice of Harvard's Dr. Joseph C. Bequaert, the foremost world authority on these snails, I was asked to return to Africa to attempt to find specific parasites as the first step in a proposed plan to control the snails biologically. I could not leave my present position, however, and Dr. F. X. Williams, an entomologist of the Hawaiian Sugar Planters' Association, went instead, to Mombasa, Kenya, and the island of Zanzibar last year.

The second step was to find ways of breeding any parasites that might be found, so that they could be introduced in great numbers in the infested areas, the theory and hope being that the parasites would soon make short work of the snails.

From my study of closely related species of giant snails in the Gold Coast, I had previously predicted that it was extremely unlikely that a suitable parasite would be found.

After six months search in the jungles, Dr. Williams substantiated my prediction. The search was not in vain, however, for a predator in the form of a white carnivorous snail, of the genus Gonaxis, about the size of a chocolate cream, was found to have real promise as a controller of *Achatina fulica*.

It must not be forgotten, however, that this fellow has not done a very good job at home. Nonetheless, specimens were shipped to Hawaii for further study and they have proved themselves able to rasp away the flesh not only of *Achatina fulica* but of almost any other snail that is put in the cage with them. They literally follow the snail right into its own home and clean it out. That sounds good until one realizes that if Gonaxis is to be liberated in numbers on some of these infested islands, it may not do any better job than in Africa, and may clean out all or most of the local snail fauna to boot. The same can be said for a giant African predatory carabid beetle, called Tefflus, whose introduction into Guam has recently been favorably considered by some authorities.

Some argue that we cannot afford to be sentimental about wiping out the local snail fauna when there is a chance of *Achatina fulica* being included on the list of Gonaxis and Tefflus. That would be good reasoning indeed if there were no other alternative. But there is. The field of chemical control of snails and slugs has scarcely been touched. Working with the specific attractant and toxicant metaldehyde as the base, there is no telling what more potent chemical might be found. We have only to turn to the apparently more attractive field of insect control to see what can be done with a little concerted effort—DDT and Chlordane being cases in point. Surely this chemical approach holds far greater possibilities than the playing-with-fire biological control. The literature is replete with the sad tales of this latter type of control boomeranging and becoming a cure worse than the disease. For example, the mongoose in Hawaii is now a far greater pest, especially to poultry, than were the snakes for which the mongoose was brought in as a control. Need more be said?

The next question is, What is the danger to us in North America? Frankly, the situation is alarming. With salvaged war materials, produce, and tourists pouring in from Hawaii, the Philippines, Micronesia, and other infested areas, a grave threat to this country exists. Worst of all, with the possible exception of Arizona, California is the only state in the Union that is properly alerted to this danger. And even California, long famous for its plant quarantine regulations, was not equal to the emergency until these snails had actually entered the state—not once or twice but several times.

There was brought into California only a few months ago salvaged war equipment which had remained in the jungles of infested areas long enough to become overrun with jungle growth. In this debris, under the seats and on the under sides of things in general, were countless *Achatina fulica*, even up to three inches in length. On arrival they left the jeeps, ambulances, and bulldozers and moved down the wharf area of San Pedro in search of some American food. Here they were discovered feeding and breeding, none the worse for the long trip. The state quarantine officers immediately threw a barrier around the infested area and literally drove the snails right into the Pacific Ocean—each time with complete eradication.

Now the California Bureau of Entomology and Plant Quarantine, under the able direction of its Chief, H. M. Armitage, has erected a paved strip of land both at San Francisco and San Pedro. All salvaged war equipment is rolled out onto these strips as it is brought ashore, and is treated with live steam under terrific pressure. So extensive is the steam treatment that the vehicles need scarcely more than a grease job before they are ready for use again.

An examination of the debris has revealed thousands upon thousand of *Achatina fulica.* Further, the California lawmakers, in full cognizance of the value of the quarantine regulations, have put into effect new regulations that empower the BEPQ to make this sort of inspection and treatment mandatory. The state is doing its darndest, and virtually alone, to keep back the enemy.

4

Quite a different situation is found in the U. S. Bureau of Entomology and Plant Quarantine. This Bureau has *no* regulations whereby it can demand similar treatment when loads come in to Eastern or other Western ports. Its regulations cover the banning of certain specific birds, mammals, and insects, but it does not have even a catchall regulation which would prohibit the entry of *Achatina fulica.* The best the Bureau can do when loads come in from snail-infested areas is to *recommend* and *solicit* the cooperation of both shipper and importer. So far, they have cooperated in the Bureau's unofficial attempts to keep this snail from landing on the East Coast. But with such a loose *modus operandi* as this, one cannot hope for indefinite success.

Here is where the real danger lies. There is in process a huge program of returning to both California and other U. S. ports between 500,000 and 1,000,000 tons of salvaged war material from regions where this snail abounds. Latest information from Washington indicates that there is *no record* of the interception of *Achatina fulica* on the Atlantic coast! Yet it has been intercepted by the thousands in California. The implication shouts.

It is apropos to point out that the Japanese beetle, the Asiatic beetle, and other Oriental agricultural pests have entered the U. S. not through the nearby California ports but through Eastern ports. With these thoughts in mind, it is neither difficult nor reckless to predict that with the present setup, and in spite of California's efforts, it is inevitable that *Achatina fulica* will get started in this country. It can spread wherever the ground temperature does not get excessively low for long periods in the winter. It would be especially bad in places like California, the Gulf states, and the Southeastern states. Its ability to aestivate or "summer hibernate" during the hot dry summers, as some of its close relatives do in regions adjacent to the Sahara, would even see it through in many parts of the Southwest.

A second and more subtile avenue of possible entry of *Achatina fulica* into this country is through the mails. Recall that the first specimen entered Hawaii by this means. There is no Federal postal regulation which can effectively cope with this danger. California and Arizona have state quarantine postal inspectors, but the very nature of packaged material has not so far permitted any real degree of efficacy. People *will* be attracted to these invertebrate giants and will send them as curiosities to relatives or friends.

And if you do not think this is an acute danger in this country, here is a recent case in point: Warren E. Buck of Camden, New Jersey, a wild-animal collector and importer of no small reputation, brought back with him from Nigeria over two years ago several live specimens of the largest species of all these giant snails, and the largest land snail in the world, *Achatina achatina.* This species attains a length just short of eight inches and gets as big around as a small saucer. But understand this: since there is no regulation prohibiting their entry, these were brought in legally.

A few months later, two live specimens were shipped through the mails to another well-known collector, Wesley H. Dickinson, of Selma and Long Beach, California. Again no Federal regulation was broken. California, however, has state regulations requiring the declaration of such imports to the local agricultural commissioner. There was a slip somewhere, for it was not until over a year later that they were quite accidentally and fortunately discovered. They had been given to the Steinhart Aquarium in the San Francisco Golden Gate Park for a few weeks, which made it possible for them to be put on display.

Dr. Tracy I. Storer, Professor of Zoology at the University of California and a member of the State Committee on Alien Animal Importation, saw these snails while visiting the Aquarium. Here were peacefully *alive* in California the very snails they had tried so hard to keep out! Urgent word of the news was immediately dispatched to W. C. Jacobson, Assistant to Director of the California State Department of Agriculture.

A thorough investigation was soon started, with the result that both snails and eggs were destroyed by quarantine authorities. Now do not let the fact that these were not *Achatina fulica* fool you for one minute. To be sure, *Achatina achatina* apparently has never had the opportunity to show whether it can be as destructive in a foreign country as its cousin *fulica*—but it *is* a cousin. Cousin *panthera*, which Sir David Barclay introduced on Mauritius, is making life miserable on that island for *fulica*. Latest word indicates that it is outfeeding and outbreeding it in most striking fashion.

There is no getting around it. The danger is already here. We in the United States are next on the *fulica* list. These few dead "scouts" indicate to us that a real invasion of this country is imminent. We must set up our defenses with no further delay. Stringent Federal regulations must be enacted to permit the U. S. Bureau of Entomology and Plant Quarantine to demand, under penalty of the law, a thorough examination, and treatment if necessary, of all produce, tourist baggage, and salvaged war material originating in snail-infested areas and entering this country at *any* port. The mail hazard must be reduced through postal inspection, advertisement, and other means. Grants and fellowships must be established to foster a great expansion of research in the chemical control of snails. And the utmost caution must be exercised in proceeding with the exceedingly dangerous biological control.

Time is short. We still have time to act. *You* are the lawmakers. *You* must decide how soon we will act. *You* must take the responsibility for effective quarantine measures or for untold millions of dollars of damage to U. S. agriculture plus many more millions spent on control.

▽

Need of Experiment

Colleges — administration, faculty, and students—must be willing to experiment and they must be imaginative, perhaps boldly so.

They must stop thinking of education wholly in terms of hours, credits, grades and patterns of courses. The faculty must work with students to infuse the entire area of campus life with experience meaningful to the education of the student as a "whole person" who will be ready to take his place as an able, self-poised, service-minded, socially responsible member of an American community.

Few colleges give their students the opportunity to study and evaluate the problems they will face; the complex personal relationships of the family situation; health and psychological problems; conflicts and confusion in the area of religion and morality; problems of money and home management; child raising and all its intricacies; the relationship of the home to the community and last but not least, the maintenance of the individual's emotional and spiritual integrity amid the changing circumstances of life.—President Katherine G. Blyley, Keuka College (N.Y.), in a talk to students.

BIOLOGY "DOWN UNDER"

By Anselm M. Keefe, Ph.D.

The biologist whose wartime lot it was to serve for any time in Australia sooner or later discovered that the rank and file among his allies was much better-informed, not only on subequatorial, but on general biology than at first it appeared. That the Australian people, by and large, are as well, if not better-educated than we Americans, is of course something that native pride would make us slow to admit. That Australians take a greater pride in the biological as well as the physical peculiarities of their weird country we must admit. That they keep themselves better-informed about their native land is not hard to believe. There are few countries in which the nationals are as ignorant of the natural wonders of their own land as are ours.

One of the reasons why so many Australians seem so much better-informed is the nature of their popular reading. That Australia is not so badly infested with such cheap reading matter as one finds in any American news stand, drug store or magazine counter is probably due to the fact that her small population (7,500,000) does not make the desecration of printing paper so financially profitable as here in this country.

In the realm of newsprint, however, there is one Australian weekly magazine which, aside from having become somewhat of a national institution, is in a class entirely by itself. This is the Sydney "*Bulletin.*" There is nothing in pare with it. "Time," "Newsweek," "Life," the "U. S. News," have certain characteristics more or less in common. They contain all the more recent developments in many fields of current interest, but in them the reader finds only what the editors decide he should the United States or Canada, or in the whole English-speaking world to com- find. Such articles as appear are all written by members of the publishing staff. Some of these publications have a few columns devoted to laudatory or critical letters from readers, but these are generally of such restricted nature as to be uninteresting.

In each issue of the "*Bulletin,*" however, there are two double-page sections which are devoted entirely to the readers' contributions. These are always printed under assumed—and sometimes fanciful—names, but so well known have the contributors' pseudonyms become that regular subscribers carefully watch for their favorite writers. Contributions are only a paragraph in length and average between 100 and 200 words. They range over the widest of fields, politics, history, economics, sport, agriculture, education, as well as the more specialized fields of science. Sometimes they are definitely humorous, and not infrequently they indulge in what Aussies are wont to call "leg-pulling." As might be expected in so great and sparsely populated a country as Australia, many of the paragraphs deal with natural history, particularly of the "outback" or the "bush," as the great, mysterious, and still too little-known interior is generally called.

The following paragraphs of biological interest have been selected at random. Where the terminology is purely local, your Editor has tried to give the American equivalent indicated by an asterisk. The initials in parentheses are generally abbreviations for the state names, sometimes with a directional "N" for north or "S" for south added. Although there are strong movements afoot to carve new states out of those now existing, the original states of the Australian Confederation are, clockwise: Queensland, New South

Wales, Victoria, South Australia, West Australia, Northern Territory, and the Island of Tasmania. Dates of the articles are also given in case any of our BIOLOGIST readers wish to secure page and volume number which will be most willingly furnished by the Editor.

"NOTADEN": Had King Solomon lived in Australia instead of a country which is poor in ants, he would not have committed the indiscretion of advising mankind to regard those fraudulent insects as outstanding models of probity and industry. It is highly surprising that he, an autocratic ruler, regarded them with any other feeling than horrified dislike. "Having no chief, overseer or ruler," as Proverbs vi, 6 puts it, they are obvious Commos., and they certainly show it in their utter disregard of the property rights of others. For us, sluggards or otherwise, it is not a matter of going to the ant but of preventing the brutes from coming to us with felonious intent. They produce nothing useful to mankind, but spoil and destroy much that is useful. Many of them sting poisonously and painfully. Their moral standards are of the lowest order. The males live in idleness under the domination of a lot of embittered old maids. Some of them—that unspeakably vicious tribe the green-tree ants in particular—practise child slavery by using the helpless infants of the community as silk-shuttles for sticking leaves together, the wretched infants having to go naked. It is high time for a Society for the Debunking of Ants, King Solomon notwithstanding.
—13 March 1946.

"HORSELESS HORSEMAN": Are there more complacent birds than the old brolgas? Outback, where trigger-happy sportsman are unknown and where year in and year out "the companions" reside in the same paddocks, I've ridden within feet of the immense feathered creatures, though they never fail to herald your approach from a distance with their high resonant note. Once, too, from a rise in the Gulf Country (N.Q.) I watched a dingo sneaking in on two birds that were grazing on the plain below. For an hour or more all the soldier-like, steel-blue fliers did each time the warrigal approached was to give a few leisurely flaps of their great wings and drop down again a few chains away. The wild dog grew tired of this performance first.—7 July 1948.

"HORSELESS HORSEMAN": For the most widely-distributed bird my vote goest to the sulphur-crested cockatoo. This near-white flier is found anywhere from the wild uninhabited west coast of Tasmania—where I've seen him feeding on maggots in the rotting kelp—through to the jungle-clad slopes of mountain-top-like Darnley Island at the northerly extremity of the Great Barrier Reef, where the screechers hang upside-down to tree vines while they feast on seeds. Generally they have a hankering for the open plains and the cleared lands of the interior, where their snowy forms splotched over stalwart gums or river flats are a refreshing sight. However, it is around Christmas on the mid-Murray that I've seen these cockies most numerous. Then, from Retail Bend around to Euston the redgum bends are filled with the deafing crying of hungry youngsters, and in the late afternoons it is common to see mobs of 2000 taking off up-river to feed.—7 July 1948.

"D.R.H.:" The sand was blank, windswept and clean, save for a tiny mottling of tracks that led to a very faint ring-like mark some 2 in. in diameter. A cautious investigation with a twig revealed that the innocent disc of smooth red sand within the almost imperceptible circle was actually a round piece of soft and flexible silk, on the upper side of which sand grains had been gummed so perfectly as quite to disguise the cover. For cover it was, shielding a vertical, silk-lined tunnel that went down 8 in. or 10 in. to the bedroom of a large and handsome trapdoor spider, a greenish-grey individual with the trapdoor equipment of poison fangs. A question arises: assuming that the spider lifted off the soft sand-masked cover at the time of her nocturnal hunting, how did she, on returning to the hole, manage to rearrange the cover from below so that it lay smooth an unwrinkled, simulating windswept sand?—29 September 1948.

"GRAVELSNATCHER": "Frank Humphrey's goanna* which, pursued by dogs, reached a tree and made a more or less leisurely ascent (B. 25/8/'48) is a stranger to me. He obviously means a racehorse "go," since the old bobtail couldn't run and would sooner offer futile fight, anyway. And a racehorse goanna's passage up a tree is something that is seldom seen, even by a keen watcher. I've put up many a "go" with a pair of 'roo-dogs, and the most I've seen has been two fleet hounds racing along either flank of a sand-wave, in the middle of which the "go" is making tracks. Suddenly the dogs stop, and retrace their steps about 20 yards to a jarrah sapling, on the top of which a new branch has appeared. I've seen that much often, but of the "go's" rise from earth to tree-top I'm as much in the dark as my dogs—and they were trained for the job. Back in the days of freedom I made money selling "gos" to Ah Fat and his gardening associates. Half-a-crown each, and they took all I could get.
—29 September 1948.

* iguana.

"PROPALONG": An Adelaide zoologist, while poking round a swamp somewhere west of Lake Torrens, disturbed a kangaroo family at its morning drink. With Dad in the lead the two adult hoppers thumped a few yards up the sandhill and then stopped to assess the biped's intentions. Joey, however, continued to count tadpoles at the water's edge. Just then the villain, in a red coat and bushy tail, appeared and commenced to stalk the infant 'roo. The old man, who had been examining his first live scientific specimen, now saw the fox and thumped his scrapers hard on the sand. Mum, hearing the signal, flung up her head, scrutinised the scenery, spotted the fox and made some small, quick movement, but apparently, no sound. Joey, however, appeared

to receive the signal and, without hesitation, dived for Mumma. Reynard made a fast dash to intercept his breakfast, only to be met by the old lady, who rolled him over with one quick boot to the starboard ribs. The zoological cove then abbreviated the fox's career with a bullet, and the **Macropus** menage hit for the mulga, no doubt discussing the strange things you meet these days around swamps.
—29 September 1948.

"SANDPLAIN": A hundred years ago Charles Darwin demonstrated the value of the humble earthworm as a soil improver by breaking up both animal and vegetable matter into humus, so valuable in promoting vegetable growth. Earthworms however, require a very moist, practically wet, soil in order to work; so in the drier areas of the earth Nature seems to have delegated the task to the white ant. Investigations have shown that the termite, cursed though it is for destructiveness, brings to the soil considerable increases in phosphoric-acid, potash, lime and nitrogen. In the early days of selecting on the half-arid Western Australean wheatbelt, knowledgeable landseekers always looked for country, mostly sandplain, well riddled by the ant. They knew that cultivation would soon root out the termite, but the fertility that the insects left behind would endure for many seasons.—13 October 1948.

"M.S.": "Shamuseen's dipsomaniac rainbow-birds (B. 15/8/'48) must share the laurels of intemperance with the Swift parrot. This little green-and-red beauty gets so sozzled on nectar at times that it falls out of its tree. But the feathered inebriate, like his human counter-part, is at the mercy of the law,—in the former case Nature's law. The policeman who enforces it is too often a prowling cat.
—13 October 1948.

"D.R.H.": Last summer through the heat of the day every bush on the flats had its little group of shade-seeking rabbits. In the winter trappers, supplying the freezing-plants set up at the sidings, reduced the numbers to within 20 or 30 miles of the line; but out in the ranges and in the sandhills the bunny populations were as numerous as ever. In the last month or so, however, rabbits have suddenly become scarce in those outlying localities. Local opinion favors migration, but as there is no news of any district receiving an influx disease and death seem more probable explanations. Just around here every rabbit that I've hacked open in the last two months has presented a striking picture. The great veins in the belly and the lesser vessels in the mesenteries between the intestines have all been swollen with blood. As the arteries are not engorged the evidence points to a damming-back of the venous circulation, either in the heart or in the lungs. Opening the heart immediately after death, before clotting occurs, one finds small thrombi, yellow or yellow-and-red bodies, adhering to the valves where they have formed in an effort to patch up damage caused by an invading organism. In this position, the patches obstruct the flow of blood into the venticles, raising the venous pressure and causing congestion. Judging by foxes and cats examined, the condition seems to be infectious.—13 October 1948.

"DERWENT": Touching on outbreaks of "foot-and-mouth disease," there's an interesting theory in England that starlings are responsible. Although it has not been proved, observers report that the disease always coincides with the appearence of large numbers of starlings from abroad. It **has** been proved that about 50 per cent, of the birds are affected with gapes, and poultry-keepers accuse them of spreading roup.—20 October 1948.

"ANTHROPO": The aboriginal always camped well away from his water-supply. It was a matter of good manners to do so and assisted in the preservation of peace. Tribes were divided into families, and all families weren't friendly—no more than in our modern suburbia. But the water-supply belonged to the tribe, and everybody was supposed to have access to it. It was the woman's job to get the water, and any party that camped right on the hole was likely to cause embarrassment to the women of another family. The abo woman, not being protected by a police force, was apt to read a menace in the wandering glances of any man other than her male relatives. Similarly the male relatives were apt to act up to a sort of chivalric code which required them to throw a few spears should their womenfolk complain of being intimidated. So it was always good business for the peace-lover to camp well away from the water once his needs were satisfied. Whites were not so wise; they invariably camped right on the waterhole, and native women feared to approach. Whereupon their lords, rightly indignant at the trespass and irritated at being kept without a drink, would rise and cast a few spears at the intruders. And the war would begin.—20 October 1948.

"EUREKA": Anyone tried eels for weather prophets? Normally the wrigglers move slowly about, close to the bottom of the creek, but when they swim rapidly near the surface it's a sure sign of wet weather. They seem to know that rain washes down insects and other fresh food from the banks.—20 October 1948.

"HANKO": I haven't met "Gravel-snatcher's" bobtail goanna (B. 29/9/'48), but the heavyweight lizard of our Eastern States can scarp over the hundred yards in around 12 seconds. Probably a cakefed Peke could overhaul one, as a mate of mine did along the sou'-west line (Riverina,N.S.W.), and that was a big go, as gos go. It measured 7 ft. 4 in. from snout to tail-tip. We had plenty of time to tape it because it swerved off the firebreak along which my cobber was coursing it, and collided with the train that puffed into action tri-weekly. It was a stiff go, as gos go, too.—20 October 1948.

"KERIN PAUL": Goannas, like snakes, don't masticate. Distrubed one once from siesta in a low single-exit hollow at Tchum Lake, near Birchip (Vic.). After sprinting the first few yards he slowed to a stumbling waddle. I "hotly pursued"—a good 10 yards behind. He stopped and half-turned to meet me, and as he was almost as big as a crocodile and I had bare feet, anyway, I stopped, too. With one full-length convulsion he vomited and ran on unhindered, leaving behind a week-old rabbit kitten drenched with saliva but otherwise intact. By-passing several bull-oaks, he hit the water and splashed through a depth of six inches for about eight yards to a redgum, scaled its trunk and entered a hollow 20 ft. up. I've often wondered whether he expected the water to deter pursuit or whether he knew that the redgum had the nearest hollow hiding-place.—20 October 1948.

"M.W.H.": That 24 ft. squid found near Sydney and the statement that it is of type given to dragging boats under water reminded me of an affair off Lockhart River a few years back. A fishing lugger had just come in with a big shark tied to the rigging, and after dropping anchor, the colored crew pulled ashore to visit the mission station. They'd just got to the beach when someone noticed that the lugger was swinging violently to one side. Suddenly it careended almost to the water's edge, then righted itself. Inspection showed that the shark had gone, and there were curious markings about the deck which led the boys to exclaim "Ah, that fella big squid been along here." They claimed there were big specimens that flung their tentacles over their prey and dragged it under. We dismissed it as a blackfellow yarn at the time.
—20 October 1948.

"PENOLA": This "quiz" rage is farreaching, and quite a lot of country school teachers are trying to brighten up school hours, I should say. It seems to make the kids a bit more cocky, too, than the ordinary school routine. A teacher here told me about one lad the other day whom he asked "What do you know of the Kremlin?" The answer came in a rush. "The Kremlin is not a real thing, really. It is an imaginary horrible object that worries airmen. They see this thing sometimes when they are in the air and make jokes about it, but they really aren't funny for the people who see them. They pull things to bits. Some people believe in the Kremlin, but really it is only a little devil." Anyway, where did the word "gremlin" come from?—20 October 1948.

"H.B.M.": It was Samuel Butler who described the homing pidgeon's instinct as "the memory of the experience of the germ-cell." All animals have the sense of direction well developed, and none better than fish. They can find their way across thousands of miles of ocean without a landmark to guide them. Theirs is a blind trail indicated, no doubt, by currents, but mainly of the experiences of the parent fish implanted in the germ-cells of the young ones. Elvers go unerringly to the inland pond their parents left when they ventured into the sea to spawn. Sea-trout and salmon do this in reverse. All kinds of birds, including the mutton variety, find their way without a lead and without previous experience except for the latent memory called instinct.—2 February 1949.

"TAM": The octopus, usually regarded by man with great repugnance, is a member of one of our oldest families which has been traced as far back as the Ordovician period, some 500 million years or so. Oysters, clams and the conch are blood-brothers. As with man it lacked claws or rending-fangs, and both had to resort to cunning or perish. Man developed an opposable thumb, and the octopus a group of tentacles with vacuum cups, plus a number of usefull arts, lately being copied by man. Jet-propulsion among the cephalopods is used to propel the mullusc forward or backward at a speed which can send him clear of the water. The art of camouflage or controlled pigmentation alone puts the octopus on a high plane, involving as it does the perfect co-ordination of thousands of cells varying with the mood of the mollusc. The deep-sea decapod can outshine the firefly with a brilliant cold light emanating at will from any part of the body. The inky fluid ejected as a kind of smokescreen serves also as a means of communication between the cephalopods. Parental care is also evident in these amazing animals, but the octopus surpasses us in its ability to grow fresh arms, to walk on its head and in its versatile breeding methods.—2 February 1949.

"BLIME": We were doing a job grubbing and clearing, and the usually garrulous Dill had developed silence and a thoughtful mien. For a bit I didn't intrude as he considered the distance or pondered a stump-bole, but, coming on him one day dreamily eyeing an enormous gum, I stopped. "What's getting you down, Dill?" I inquired. For a few seconds he didn't let on; then he turned with a sigh. "S'pose it's this job," he murmured. "Makes a bloke think, don't it?" "About y'r tax?" "No. 'Bout Nature," he sighed again, "some folks rush through life and never try t' get the hang of it. Cripes, it gets me. I dunno." I looked at him perplexedly and managed an agreeable sort of grunt. "Tha animals 'n' everything in it," he went on. "'Course a bloke c'n understand a rabbit diggin' a hole with a mound outside, an' he c'n see the sense of a wombat burrer, an' a line o' fence, an' all that, but you take a tree now, like that 'un there." I eyed the giant, and opined it had been there a long time. "Yair, but don't y' see that makes no difference," Dill argued solemnly. "The ground was level when that tree started, wasn't it? An' it's still level. Well, what I want t' know," he concluded, "is what the blazes it done with all the dirt it shifted to make room f'r them great big roots an' that stump?"
—23 February 1949.

"BON-YI": Best approach to what an atomic-bomb explosion looks like is 100 acres or so of felled scrub up in smoke on a windless day when the humidity is high. Lit on the edges of the area of piled leaves, trunks and branches by men with flame-throwers, the fire creates its own tremendous up-draught as it burns towards the centre, the thick dark smoke rising quickly thousands of feet up in a great column slowly mushrooming out as it reaches the higher currents of air. Moisture-laden air sucked in from ground-level rises with the heated gases and condenses above the pall of smoke in a vast churning snow-white cloud of vapor. One I saw recently of 100 acres on a forestry reserve near Yarraman (Q.) gave an amazing "Bikini Bomb" effect with its enormous head of vapor. At such a fire, the in-rushing winds create tremendous whirlwinds that tear across the roaring masses of sparks, flame and red-hot ashes, terrifying to watch coming toward one.—23 February 1949.

"K.M.C.": The **Chrysalina** species of beetles, liberated among St. John's wort in Victoria and S.A. and, to a lessor extent, N.S.W., are giving such good results that it is anticipated that soon that pest will be brought under control. These beetles, about ¼ in. long, bronze-black in color, first eat the bottom leaves, then climb up to clean up the flowers. After eating any stray leaves as they crawl downward mating begins. The females deposit their eggs in the ground. The parent beetles then die, but the larvae grubs which hatch from the eggs burrow into and attack the roots of the wort. Since being liberated in 1946 the **Chrysalina** have left only an odd plant on some hundreds of infested acres in the Clare district (S.A.) and at Bright (Vic.). When one patch is cleaned up they fly to another. Beetles have also been liberated in infested areas at Mudgee and Rylstone (N.S.W.)—23 February 1949.

"WIPPEGONG": Don't let 'em tell you that all birds that resort to camouflage are quietly colored. For the ground-dwellers —quail, curlew, plover, larks, dotterels and the like —yes; they, and especially their chicks, melt into the grass, but sometimes the bright ones are just as hard to locate. Crossed the creek the other day and from behind the scrub lining the road there arose a deafening racket that invited investigation. No trouble finding the row; it was all in an old Gravenstein apple-tree, and the rainbow lorikeets had descended for the harvest. The soft green of their backs and tails blended perfectly with the foliage and the bright red breast, flecked at the edges with orange, merged just as well with the fruit. And movements added to the deception; as birds clambered down the branches the apples bobbed, and from where I was what appeared to be a parrot would be shaken off and flop to the ground, while apparently prime Gravvy would suddenly screech and fly away. Trying to count them I would not have sworn to more than a dozen birds, though from the din I knew that must have been a long way short, so went closer and flushed them; there must have been fifty. Flashing around in the sun they were no more hidden by their color than by their unceasing noise, but when they settled again most of them just vanished. Yet if one of the drab fowl—a friar-bird or a mopoke, say—settled on the same tree it would stand out like a wart on Mo's nose.
—23 February 1949.

"ZAKE": Were I a grazier I'd go in for oleanders in a big way as a station-homestead shrub—blowflies will come from miles around to get at their favorite. And they are also death to pests. Of prolific flowering habit, the blooms of the oleander lure the blowy in after the concealed honey which is well up out of reach. The fly pokes his tongue out to get it and is trapped—how, I haven't found out. But the mortality rate is high.
— 23 February 1949.

"GROPER": So "Kilkennicat" (B. 19/1/'49) has seen snakes travelling backwards? Reminds me of Carr Boyd, noted raconteur and explorer of Coolgardie days. On a visit to England Carr undertook to deliver a lecture on Australian serpents. Asked to describe how a snake dug its hole, and what it did with the excavated dirt, always notably absent from the immediate surroundings, Carr introduced the corkscrew snake. This reptile, roused from the customary serpentine coil, stood on its tail, and, whirling rapidly, burrowed into the ground just as a corkscrew burrows into a cork. Carr also explained that this particular reptile was fitted with a hard bony blade at the end of its tail, much after the style of the rattlesnake. Now, has any of the bush fraternity ever come across the corkscrew snake? Also, will they explain to one who has never had the luck to see a snake digging its hole how the reptile does it: and what does it do with the soil? Incidentally, one ancient bushie informs me that the corkscrew is sometimes called the gimlet snake.—2 March 1949.

"RADIAN": Met up with a timber in New Guinea that gave remarkable results when used for submerged bearings on marine propeller shafts. In a workshop unit during the war we were at a loss to find a substitute for the rubber composition used in outboard bearings of some landing-craft. Any type of metal bearing tried cut out in less time than it took to fit. In casting about for something different a bright spark remembered that lignum vitae was used for much the same purpose, and he turned up trial bearings from a greasy-looking local timber. These actually gave better service than the original bearings. The tree concerned was common around Buna and Oro Bay, although I don't remember seeing it further up the coast. The name I think was cussa-cussa.
— 2 March 1949.

"SOUTH COAST": Mention of Tin Can Island (B. 2/2/'49) recalls that it is also the home of one of the world's curiosities; a bird that, no larger than a pigeon, lays an egg the size of a double-yoked hen-egg and brick-red in color. The Tongan Government put a ban on the collection of these eggs 20 years ago, but now the evacuation of the human population may give the birds a chance to increase; especially as the Malau lays its abnormal egg only twice a year. Like the rest of the Megapode family, it leaves the egg to hatch in a mound of sand, and the youngster fends for itself.—2 March 1949.

"NOR'-WEST": Regarding the toredo resistant properties of Californian redwood and pitch-pine, let me assure "Hell-dud" (B. 20/7/'49) that I speak from experience, having run a boat with pitch-pine keel and redwood planking in some of the most infested waters of the west; waters where jarrah and the iron-hard tuart were just pie to the toredo. Anyway to draw an analogy from termites to toredos is absurd. Even pitch-pine long exposed to atmospheric influences will lose its immunity, which resides in the turpentine that it contains; being a volatile spirit, turpentine slowly evaporates. In my various habitations and works I have never seen genuine pitch-pine attacked by termites; the same applies to redwood. And W.A. and the N.T. know more about termite appetite than the eastern part of the continent ever dreamed of. But don't confuse redwood with red-pine. Both come from U.S.A., and both are red, the pine even being tolerably free from knots, and thus often passed off as redwood. Redwood **(sequoia)** is a native of the Pacific slope. Red-pine **(P. resinosa)** grows mostly in Minnesota and Wisconsin; an excellent timber largely used as flooring in an earlier Australia.—24 August 1949.

"MUG GARDENER": When I first dug over my quarter-acre in a Perth suburb it was about as fertile as a scrap of Sahara. Even 20 years' loading of it with all kinds of organic manures didn't improve it much: potatoes about as big as hen-eggs; cauliflowers all leaves; cabbages the same; and so on. Reason: though the soil was really over-manured there were no worms, such being alien to the Westralian native sand. Then a few years ago worms appeared, possibly through the shaking of a few empty potato-sacks, the grower's makeweight soil in the bottom of the sack apparently carrying a few eggs. Every winter after that my garden fairly seethed with worms. And how things did grow! Single spuds a pound weight; caulies up to show standard, etc. Although before the advent of the worms my soil was full of plant-nourishing material it was not in a form that plants could readily assimilate. But it was fine fodder for the worms, who in their thousands devoured it and then returned it, predigested and finely divided, just the right stuff for the vegetables.
—23 November 1949.

"WIPPEGONG": The iron barks are in flower, and at odd times during the day a shrill, tremulous screech will draw your eyes up just in time to catch a flash of green as a few slim birds hurtle over and disappear among the pink blossoms. Disappear is right, for despite their vivid green—or maybe because of it—they are lost when they land within the foliage. They are little lorikeets, midgets of the parrot clan. As with so many colors in our landscape, theirs needs the sunlight to bring out its brilliance, so as soon as they alight in the tree they are one with its shadows. But if the wind isn't swinging the pendulous branches too much you'll soon spot the wee parrots, for there is an urgency about their feeding that forbids their keeping still, and they bustle up, down and along the slim twigs, cribbing, sipping, and generally behaving as if they, like their superiors, were forbidden to consume nectar after six o'clock and had to guzzle while they could. They provide one of the outstanding examples of adaptation to environment. Look into an ironbark blossom and you'll see a stamen-fringed cup about ⅛ in. across and maybe a bit deeper, with a green column standing in the centre. Around the base of this lies the nectar; to remove it easily you'd need a small brush—and that's just what the lorikeet carries, right on the tip of his tongue. He slips along a flower-laden spray with a speed that speaks for the efficiency of this built-in device; just a jab at each bloom and it's done with. Many of the honeyeaters are similarly equipped, but it is only in this region, where these feathery flowers of the gum, box and bottlebrush type predominate, that brush-tongued birds are common. As for how long these took to evolve that special organ, your guess is as good as mine.—23 November 1949.

Free Environment for Science

Engineering developments can usually be carried through in accordance with a plan carefully prepared in advance, and often this can be done most effectively by a competent self-contained group like a company or a bureau. But scientific discovery, in its very nature and as proved by experience, does not progress according to preconceived plan and is stifled if attempts are made to control the free initiative of the research workers or to limit the freedom of communication between them. This is one reason why most of the fundamental new scientific discoveries have originated in free environment of the universities rather than in the quite properly more controlled atmosphere of industrial or governmental laboratories. When, however, it comes to practical applications and engineering developments, then thorough planning and control are essential to efficiency. To the extent that we wish fundamental science to advance, we must maintain the maximum of opportunity for competent scientists to follow their own bent and to communicate freely with each other.

—Dr. Karl T. Compton, at M.I.T. Mid-Century Convocation.

EDITORIALS

ASSOCIATION OF COLLEGE HONOR SOCIETIES

At its annual meeting on 25 February in the La Salle Hotel, Chicago, the Council of the Association of College Honor Societies voted to accept Phi Sigma into the Association. Also accepted was Phi Sigma Iota (Romance Languages). The member organizations of the A.C.H.S. include the following national honoraries:

- Alpha Epsilon Delta (Premedical)
- Alpha Lambda Delta (Freshman Scholarship Women)
- Alpha Omega Alpha (Medical)
- Beta Gamma Sigma (Commerce)
- Eta Kappa Nu (Electrical Engineering)
- Mortar Board (Women Leadership Activities)
- Omicron Delta Kappa (Mens Leadership Activities)
- Order of the Coif (Law)
- Phi Alpha Theta (History)
- Phi Eta Sigma (Freshman Scholarship Men)
- Phi Kappa Phi (All Academic)
- Pi Kappa Lambda (Music)
- Pi Sigma Alpha (Political Science)
- Pi Tau Sigma (Mechanical Engineering)
- Rho Chi (Pharmacy)
- Sigma Pi Sigma (Physics)
- Sigma Tau (Engineering)
- Tau Beta Pi (Engineering Men)
- Tau Kappa Alpha (Forensics)
- Tau Sigma Delta (Architecture and Arts)

The Association was founded 2 October 1925 by Phi Beta Kappa, Sigma Xi, Tau Beta Pi, Phi Kappa Phi, Alpha Omega Alpha and the Order of the Coif. Its objectives are to join forces among general and departmental honor societies for the establishment and maintenance of desirable standards and useful functions in higher education. To this end the Association recognizes a twofold grouping of honor societies, the general and the departmental honor groups. The former cover achievement in wide fields such as agriculture, education, fine arts, science, and so forth. The latter are more specialized and cover the achievement in courses, departments or special fields such as Architecture, Biology, Language, Pharmacy, Physics, and so forth.

Dr. Guy E. Snavely, Executive Director of the Association of American Colleges, was the guest speaker, at the Council Banquet, his subject being "The World's Spiritual Plight." In the course of his address he told of a visit he made last summer to the Near East and the Orient and described some of the conditions he observed. Dr. Snavely believes that world conditions are improving—gradually, perhaps, but unmistakably.

In his introduction Dr. Snavely expressed the following opinion about college honor societies:

> "The college honor societies render conspicuous service in the advancement of higher educatoin in the United States. They stimulate in a noble way efforts to higher endeavor on the part of college and university students. From this select group come the great majority of the leaders in the professions and in industry, also those who direct the affairs of state on local, national and international levels. The Association of College Honor Societies aids greatly in correlating the ideals and activities of the various groups."

The following officers were elected to hold office until the annual meeting of 1951:

President—Dr. Marsh W. White, executive secretary of Sigma Pi Sigma (physics—men and women), State College, Pa.

Vice-President—Dr. George L. Webster, president of Rho Chi (pharmacy—men and women), University of Illinois College of Pharmacy, Chicago, Illinois.

Secretary-Treasurer—Robert H. Nagel, secretary-treasurer of Tau Beta Pi (engineering—men), Knoxville, Tenn.

That Phi Sigma should be chosen to represent the Biological Sciences in this honor group is a matter over which every past, present, and all future members should take reasonable pride. We say "reasonable pride" because the acceptance of our society into this national group of scholastic honorary organizations is, in effect, a challenge that we should never lower the standards of Phi Sigma. The world is full of recognition, of service, and of honorary groups. Of all of them it can be nothing less than the best that honors most. For a group to be able to confer honors on a person, that group itself must, by its own honor, by its standards, by its selectivity, be so honorable that when it selects others to honor, that honor must be so desirable that it will be willingly, gratefully, humbly accepted.

To the Association of College Honor Societies, its officers, and to the Chancellor of Phi Sigma, Dr. A. I. Ortenburger, to all our thanks for this happy and encouraging event.

BIOLOGICAL SUMMER STATIONS

While it is still a bit early to be hearing from the summer schools which specialize in their biological offerings, the Editor has received three equally interesting brochures which should be brought to the attention of our society members. These came from the Duke University Marine Laboratory at Beaufort, North Carolina, from the Biological Station of the University of Michigan at Douglas Lake, Cheboygan, Michigan, and from the University of Minnesota Biological Station Summer Session at Lake Itasia, Douglas Lodge, Minnesota.

As one who spent the eleven summers from 1921 to 1932 at the Marine Biological Laboratory at Woods Hole, Massachusetts, the Editor of THE BIOLOGIST cannot put sufficient emphasis on the advantages of the specialized summer school in the field of one's special biological interest.

The summer school has come to occupy a unique place in our American educational system. It is short, it concentrates on only a few courses, and for these two reasons it lends itself admirably to the concentrated attention of the student and his professors on one or the other particular phase of learning.

Alexander Agassiz long ago emphasized the ideal of biological training and his original poster long hung in one of the Marine Biological Laboratories at Woods Hole. It may still be there. In quaint Spencerian script the beautifully formed legend ran: "Study Nature Not Books."

This is exactly what the biological, the forestry, and the geological summer stations aim to do. They take the student out of the more or less artificially over-organized atmospheres of our university and college laboratories and put him in more intimate contact with nature in the field. This is all to the good.

There are narrow minds who can glue their noses into textbooks or strap their eyes to microscopes and learn all there is to know about the narrow fields of their special interests. They may develop into good graduate teachers and research leaders, but they will always lack that general, broad, and stimulating background which makes for interested and interesting leadership in the classroom and on the lecture platform.

American education is blessed with a wide ranging number of biological field schools who offer this latter kind of experience. They range from New England in the northeast and Florida in the southeast to Puget Sound in the northwest and California in the southwest. The student of biology who has not attended at least one of them has not only missed a valuable experience, —he has been cheated.

Those who are interested in any particular type or locale should write to the director of summer sessions at the nearest large university to the area of their interest and inquire what offerings there are in the field.

SUBSCRIBING TO THE BIOLOGIST

Every year the Editor receives requests for the forwarding of the magazine to new addresses of newly graduated members of the Society. This year's crop of such requests has increased to such a point that something must be done about it.

In the economy of our organization, every student who meets the financial and other requirements of membership in his chapter is supposed to be furnished with a copy of each issue of this magazine which appears while he is still active in the affairs of his chapter. The responsibility for seeing that his copies are ordered and delivered to him devolves on his chapter officers.

Once he has left his chapter, either by reason of transfer or graduation, his subscription to THE BIOLOGIST ceases. If he wishes to receive it any longer, he must subscribe. A subscription blank is printed on one of the later pages of each issue of the magazine. It appears there not merely for the purpose of filling up space. A word to the wise should be sufficient.

BY WAY OF EXPLANATION

This issue of THE BIOLOGIST has been delayed. The Editor who, like the rest of the officers on the Council, has to earn his daily bread as a professor of biology, has been dogged this year by a whole succession of those pestiferous annoyances which have effectually delayed getting this magazine out to you. Not the least of these have been two bouts with illness sufficiently devitalizing to slow down all normal extracurricular activities. Your kind indulgence is appreciated, and we hope to reward your patience with two oversized and interesting issues.

Our thanks to our contributors for this issue. How about joining this select coterie? The last two issues contained articles on what kind of student material we would like to publish, but the first article in this issue says more by example than this page can ever do by indoctrination. James Peters is a graduate student at the University of Michigan. What he has done so well others can do. Why not try? Your contribution will be most welcome.

▽

Guideposts to Leadership

Hit the line hard—with all you have. Do the task at hand as tho your entire future depended upon it.

Growth comes thru added responsibility. Seek it; don't avoid it. Take life as a great adventure.

Prepare today for the job you hope to have tomorrow, always giving more than you receive—this is the road to achievement.

Let your constant motto be: "Boldness with common sense and tact," acting always in quiet confidence. Great attainment calls for daring always.

Develop a good "follow thru." Persistent attention to every detail is a vital element in success.

Make clearcut decisions, after you have all facts.

Don't worry about who gets the credit.

Learn to be a good listener.

Put yourself in the other fellow's shoes, before giving orders or making decisions.

Be quick to pay compliments when deserved. If criticism is necessary, make it in private.

Be careful never to build yourself up at the other fellow's expense. His friendship and cooperation are far more valuable than any momentary personal gain.

Cultivate those you don't like, and try to appreciate their good points.

Never hold a grudge. Clean the slate daily. Cultivate greatness of spirit.

Never feel sorry for yourself. Maintain an attitude of gratitude. Follow Cromwell's motto, "Think and Thank."

Live one day at a time.

Take a few deep breaths every time there is an interruption—like a phone call.

Every two hours, relax completely for one minute; breathe deeply and get a new perspective.

Be concerned, but do not worry. Remember—you are made for victory.

Get eight hours sleep. In an emergency, keep in mind that what you are doing is more important than how you feel.

Take 15 minutes a day to "get on the beam." [Orientation]. Morning gets best results.

—Melvin J. Evans.

NEW BOOKS

This section offers brief uncritical reports on the general content of recent publications in biological and related fields. Only the longer critical reviews will be signed. For quick location on library shelves, each notice will be preceded, wherever possible, by three groups of numbers, the first two of which will be the Dewey and the Library of Congress classified numbers respectively. The third group is the L.C. card number, for the convenience of Librarians.

ABBE DAVID'S DIARY, Transl. by HELEN M. FOX, Harvard Univ. Press, Cambridge 38, Mass., 1949, 302 pages, $5.00.

574.951 QH11.D3 49-3609

One doesn't need to read the publishers descriptive matter on the dust jacket of this unusual book. Its three hundred pages are chock full of plant and animal taxonomy and ecology, describing the authors travels around China from 1866 to 1869. Abbe David was not only a missionary-scientist, he was also a scientific cosmopolite, as competent in one field of biology as in another. A fascinating work.

AMERICAN SPIDERS, Willis J. Gertsch, D. Van Nostrand Co., Inc., New York, Toronto, and London, 1949, 285 pages, $6.95.

595.44 QL457.1G4 49-11600

In this one volume with its 32 colored and equal number of Rotogravure illustrations, is compacted a tremendous amount of arachnid information. The author is assistant curator of the Insects and Spiders in the American Museum of Natural History, which accounts for much of its accuracy, to which the unusual colored photographs contribute equally.

ANTIBIOTICS, Edited by GEORGE W. IRVING and HORACE T. HERRICK, Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., 1949, 273 pages, $6.75.

615.329 RS161.I7 49-6050

This slim volume is sponsored by the U.S.D.A. Graduate School. It consists of 14 chapters written by: George W. Irving, Horace T. Herrick, K. B. Raper, Henry Welch, G. O. Cragwall, S. A. Mapsman, Karl Falkers, C. S. Kiefer, Renie J. Dubos, W. J. Robbins, and J. Heishman. Its content matter covers the field up to January 1947.

BIBLIOGRAPHY OF CULTIVATED TREES AND SHRUBS, by ALFRED REHDER, Harvard University Press, Cambridge, Mass, 1949, 825 and XXXVII pages, $20.00.

016.58216 Z5356.T8R42 49-5595

This extraordinary publication really deserves something more than the thumb nail sketch customary in this publication. The book is huge, being printed on 8x12 inch pages with two columns of fairly fine print on each. The foreword is a rightly well-merited appreciation by Dr. E. D. Merrill, Director of the Arnold Arboretum. The Author's introduction explains the purpose, scope and techniques used in assembling it. There are also special preliminary sections devoted to the abbreviations used either for the publications quoted, or for the Latin terminology required in a work of this kind. The systematic enumeration of cultivated trees and shrubs runs from page 1 to 647. The balance of the work is taken up by the 224 pages of index. In stating the purpose of his labors, the venerable retired curator of the Arnold Arboretum sums it all up very clearly and briefly: "The purpose of this bibliography is to give references to the sources of the botanical names, valid names, and synonyms, of the woody plants cultivated in the cooler regions of the temperate zone of the Northern hemisphere."

BIRDS, by Herbert S. Zim and Ira N. Gabrielson, Simon and Schuster, Inc., Rockefeller Center, New York 20, N. Y., 1949, 155 pages, $1.00.
598.2973 QL681.25 49-9560

This is almost small enough to be called a vest-pocket-sized book with 112 illustrations in color making possible the identification of some 126 bird forms. There are twenty pages of tables which list all the forms mentioned with their migration dates, number and size of eggs, nest materials, nesting locations and food.

BRAZILIAN SPINY RATS, by Joao Moojen, University of Kansas Press, Lawrence, Kansas, 1948, 98 pages, 140 text figures.
599.32 QH7.K3 49-45046

This is a monograph on the speciation of the genus Proechimys, family Echimyidae. It is divided into the subgenera, proechimys and trinomys, nineteen of which belong to the former, and eleven to the latter, with one still classed as *incerta sedis.*

THE CHEMISTRY AND PHYSIOLOGY OF GROWTH, edited by Arthur K. Parpart, Princeton University Press, Princeton, N. J., 1949, 293 pages, $4.50.
574.134 QH511.P3 49-8368

This rather profound and very thorough symposium on growth factors includes papers by men like Northrop on Enzymes and protein synthesis, Schmitt on molecular morphology and growth, Thimann on Plant Hormones, Folkers on Vitamins, Van Niel on Genetics of microorganic growth, Burron on Metabolism, Weiss on differential growth, Nicholas on organization, Rhonds on neoplastic abnormal growth, and Long on the adrenal gland as a regulator.

THE CHEMISTRY OF ORGANIC AND MEDICINAL PRODUCTS, by Glenn L. Jenkins and Walter H. Harting, John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1949, 745 pages, $7,50.
615.3 RS403.J4 49-50110

This is the third edition of a standard text for advanced courses in chemistry as part of pharmaceutical, biological and medical training. A tremendous number of compounds are discussed. Structural formulae are freely used, most of the pages offering one or more. One of the more interesting and helpful features is the attention offered to many of the new antibiotics, antihistamines, enzymes and folic acid. Chapter bibliographies are generous, and there are many footnotes on special references as well.

CHARLES DARWIN, THE NATURALIST AS A CULTURAL FORCE, by Paul B. Sears, Charles Scribners Sons, 597-599 Fifth Ave., New York 17, N. Y., 1950, 124 pages, $2.00.
925.9 QH31.D2S4 50-5237

Dr. Paul B. Sears, one of the elder living members of Phi Sigma and for many years its National President or Chancellor has achieved a well merited reputation as a leader in the conservation of economic and social as well as natural assets of our national heritage. In this new book—one of the smallest he has thus far written, Dr. Sears champions the conservation of cultural forces as well as natural, economic or social. To do so he chose as his theme one of the greatest of all the Naturalists, Charles Darwin. In this he is wise. Of all the men of science who have sought new horizons, none has seen farther, made greater progress toward them and as a result has been more praised and equally more blamed than the subject of this series of essays.

To see Darwin in his true light—to get him into accurate perspective, to set him in his proper place in the forces that have moulded our cultural background, has been the author's theme. That he has done so well, in so short a space is a credit to the ripeness of his scholarship. This is science at its best, integrating with the other fields of knowledge, history, philosophy and sociology. Dr. Sears has written larger books. He has written nothing better.

CITY OF THE BEES, by Frank S. Stuart, Whittlesey House, McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1949, 243 pages, $3.00.

595.799 QL565.S75 49-7221

If more people read prefaces there would be less chances that book reviews could be accused of the uncharity which led one august member of the profession to excoriate this particular publication for its fantastically fine writing. The author explicity states that "this book is an imaginative fantasy." The following lines sum up its purpose to a "T"—"The events recorded here really do happen to bees and birds and animals in the same world where, so pitifully unheeding, 'Civilized' man stamps and frets along his little rut into his grave, never looking around at the beauty, savagery, emotion and wonder that he rushes blindly past."

COLLEGE BOTANY, by Clarence J. Hylander and Oran B. Stanley, The MacMillan Co., 60 Fifth Ave., New York 11, N. Y., 1949, 638 pages, 453 Illus., $5.00.

580 QK47.H9 49-6231

This new text commends itself by reason of its wealth of fresh new illustrations, and the equally fresh approach to the teaching of botany. It is a very full book, designed for a year course. The first half of the text is devoted to the plant as an organism, the second half to the plant world. So many and so varied are its unusual qualities that it must be seen and studied to be fully appreciated.

DENTAL ANATOMY, by Robert C. Zeisz and James Muckalls, C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo., 1949, 483 pages, 427 illustrations, $4.00.

611.314 RK280.Z4 49-48840

This large atlas of dentition has two divisions, the permanent teeth being treated by Dr. Zeisz, the deciduous teeth by Dr. Muckalls. Each of the teeth on the right side of the jaw is pictured from five different angles—buccal, lingual, occlusal, mesial and distal. The illustrations are extraordinarily well done. Together with the very complete glossary, they help to make this an excellent reference work even for those who are not medically interested.

DIAGNOSIS OF VIRAL AND RICKETTSIAL INFECTIONS, edited by Frank L. Horsfall, Columbia University Press, Moringside Heights, New York, N. Y., 1949, 153 pages, $3.75.

616.9082 RB37.H7 49-8684

This symposium consists of twelve papers by recognized authorities on the diagnosis of influenza, mumps, pneumonia, poliomyelitis, herpes, rabies, dengue, typhis, spotted fever, rickettsialpox, hepatitis and several other viral or rickettsial type infections. In all thirty-two are discussed. There are bibliographies for each type presented. A disappointing feature of this book is its total lack of subject index.

DYNAMICS OF VEGETATION, by Frederic E. Clements, H. W. Wilson Co., 950-972 University Ave., New York 52, N. Y., 1949, Pages 296.

581.52 QK901.C615 49-2164

This memorial volume is made up of eight chapters taken from various publications of the late Dr. Frederic E. Clements of the California branch of the Carnegie Institution. Dr. Clements was a botanist starred in "American Men of Science" and an ecologist who held for many decades an outstanding position in the educational and research world. The titles as well as the subject matter of the chapters selected hang together well,—plant succession and human problems; competition in plant societies; plant indicators; nature and structure of the climax; the relict method in dynamic ecology; climaxes, succession and conservation, ecology in public service. The seventh title, "climatic cycles and human populations in the great plains,"—has been singled out as one of the most brilliant essays Dr. Clements ever wrote.

THE EARTH'S GREEN CARPET, by Louise E. Howard, The Rodale Press, Emmaus, Pa., 1947, 258 pages, $3.00.

630 S493.H73 47-3994

The Rodale Press has long been noted for its championing the cause of organic as opposed to chemical fertilizers in gardening and agriculture. The present contribution to its cause is a summary of the ideas of the author's husband Sir Albert Howard, who formerly held the position of Director of the Institute of Plant Industry, Indore, and Agricultural Adviser to States in Central India and Rajputana. The book should be a particular interest to those who have large herds of cattle or stables from which much available waste products could be utilized.

ELEMENTARY PLANT PHYSIOLOGY and A LABORATORY MANUAL TO ACCOMPANY THE TEXT, by STUART DUNN, Addison-Wesley Press, Inc., Kendall Square, Cambridge 42, Mass., 1949, 164 and 100 pages.
581.1 QK711.D93 49-48311

Both text and laboratory manual have been developed at the University of New Hampshire as the solution to the problem of a one-semester course, not too technical for beginning students in plant physiology. The text is well illustrated and the experiments appear to be exceptionally well chosen.

EMBRYOLOGY, by LESTER GEORGE BARTH, The Dryden Press, 386 Fourth Ave., New York 16, N. Y., 1949, 330 pages, $5.00.
611.013 QL955.B187 49-9187

In this rather unusual textbook experimental studies have been incorporated into the material presented, thus bringing together observations and experiments into one unified exposition. The author is thus breaking definitely with the old "look, see, draw" type of teaching, and stressing the experimental as well as the theoretical side of the subject. Always there is held out the possibility and the promise of future developments in the field. This should, as Dr. Heilbrunn suggests, "bring new zest to the teaching and learning of embryology."

THE EPITOME OF ANDREAS VESALIUS, translated by L. R. LIND, The MacMillan Co., 60 Fifth Avenue, New York 11, N. Y., 1949, 132 pages, $7.50.
611.04 QM21.V426 49-6502

Four hundred and seven years ago Andres Vesalius published his "Seven Books on the Fabric of the Human Body" and the "Epitome." The latter was a brief condensation of the main work. It has now for the first time been translated into English. As one long used to the reading of mediaeval as well as classical Latin, this reviewer is glad to congratulate Dr. Lind on the very acceptable job he has done. There may have been times when he had to choose between accurate translation and the modern idiom. Dr. Lind's choices have been uniformly happy. It was also a happy thought to follow each translated chapter of Versalius with a general interpretation and a section of Notes for which Dr. C. W. Asling is responsible. Happiest thought of all was to reproduce the original "Epitome" in fine though readable type together with full page reproductions of the nine famous illustrations with which the "Epitome" closes.

EVALUATION OF CHEMOTHERAPEUTIC AGENTS, edited by COLIN M. MACLEOD, Columbia University Press, Morningside Heights, New York, N. Y., 1949, 205 pages, $4.00.
615.1 RM663.M3 49-3269

The results of the New York Academy of Medicine symposium held in 1948 are here presented to the world. The 14 papers cover a wide range of modern treatments for human disease by the use of the products of chemical research. Not only are the results of using the newer discoveries analyzed, there are many discussions of different techniques in their use. The term "chemotherapeutic agents" is here taken to include not only synthetic compounds, but also antibiotics. There are also two papers on experimental and clinical usages in cancer.

EXTERNAL MORPHOLOGY OF THE PRIMATE BRAIN, by CORNELIUS J. CONNOLLY, Charles C. Thomas, Springfield, Ill., 1950, 378 pages, 337 figures.
611.81 QM455.C63 50-265

Only a professional physical anthropologist could adequately evaluate this new and very compendious work. As the publication of many research years begun at the U. S. National Museum, when Dr. Hrdlicka was still its curator, the author presents the results of his detailed studies on the brains of 333 sub-human forms, 84 human fetal, and child, as well as 120 adult white, Negro and Mongolian brains. The eleven chapters are divided into the following headings: fissural patterns of primate brains; encephalometry; development of cerebral sulci; brains of newborn and children; fissural patterns of white and negro brains; brain and race; sulci and cortical area relationships; endocranial casts and fissuration; sulcal relations in anthropoid and human brains; fissural impressions on casts of prehistoric brains; homologies and the origin of sulci.

FACTORS OF EVOLUTION, by I. I. SCHMALHAUSEN, the Blakiston Co., Philadelphia, Pa., 1949, 327 pages, $6.00.
575 QH366.S372 49-5812

Subtitled "The Theory of Stabilizing Selection," this work has been translated by Isadore Dordick and appears under the editorship of Theodosius Dobzhansky. The author was for a time director of the Institute of Evolutionary Morphology, but failed to keep in step with Lysenko and the rest of the government-dominated scientific (?) group so he has been expelled from the Russian Academy. The book's main theme is synthetic, searching out all the evolutionary factors to be found in biological science, not only genetics, but also paleontology, taxonomy, comparative embryology, and anatomy.

THE FORAMINIFERA, by JOSEPH A. CUSHMAN, Harvard University Press, 44 Francis Ave., Cambridge 38, Mass., 1948, 605 pages, $10.00.
593.12 QL368.F6C766 48-9473

This fourth revised and enlarged edition of what is perhaps the world's greatest work on the subject is enriched with 55 plates, each containing up to 25 figures which accompany the 31-page key to the various genera. There is also a 66-page bibliography broken down into 13 headings. The introductory chapters cover descriptions of living foraminifera; their tests, methods of collection, preparation and study, economic uses, geographic and geologic distribution, and trimorphism. The foraminifera are valuable because of their relation to oil geology. Hence the interest that has developed regarding a group of otherwise comparatively unnoticed protozoons.

FUNCTIONAL ANATOMY OF THE MAMMAL, by W. JAMES LEACH, McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1946, 231 pages, $3.00.
611.072 QL739.L4 47-266

Based entirely on the cat, this laboratory manual seeks at every point to correlate the animal structural details with those of the human. For Pre-Medical students this should be helpful.

FUNDAMENTALS OF BACTERIOLOGY, by MARTIN FROBISHER, JR., W. B. Saunders Co., West Washington Square, Philadelphia 5, Pa., 1949, 936 pages, $5.00.
589.95 QR46-F76 49-5492

This fourth edition of a well and favorably known compendious textbook has been completely brought up to date, both as to techniques and material. Thus, for example, the latest plain and electron microscope discoveries have been incorporated.

FUNDAMENTALS OF COMPARATIVE EMBRYOLOGY OF VERTEBRATES, by ALFRED F. HUETTNER, The MacMillan Co., 60 Fifth Ave., New York 11, N. Y., 1949, 309 Pages, $5.00.
591.3 QL959.H92 49-9357

This revision of the 1941 edition with all its fine illustrations, will keep all the friends its predecessor made, and make new ones. This reviewer sees no reason to change his previous judgement that this is, either as text or as reference work, definitly "a book to be kept on the shelf of every comparative Embryologist."

GENETICS OF THE FOWL, by F. B. HUTT, McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1949, 590 pages, $6.50.
636.50824 SF487.H97 Agr. 49-459

This new book is a definite contribution to scientific literature in that it gathers between one pair of covers all the worthwhile information dealing with poultry genetics up to the present time. Variations are considered in separate chapters devoted to the skeleton, skin, plumage, color, body size, egg production, type of eggs, and disease resistance. There are 71 tables and 140 figures, most of them new. Several of these are photographs.

GENETICS, PALEONTOLOGY AND EVOLUTION, Edited by G. L. JEPSEN, S. G. SIMPSON and E. MAYR, Princeton University Press, Prince-

ton, N. J., 1949, 474 pages, $6.60.
575 QH366.J43 49-9873

This series of twenty-three papers by as many scientific leaders is organized into eight chapters dealing respectively with geological time, viewpoints on evolution, evolutionary trends, evolutionary rates, speciation, adaptation, human evolution, and a summation. The papers grew out of a symposium of geneticists and paleontologists who sought to discuss their common interests. Their conclusions are not conclusive, but they are stimulating.

HANDBOOK OF FROGS AND TOADS, by A. H. Wright and A. A. Wright, Comstock Publishing Co., Inc., Ithaca, N. Y., 1949, 640 pages, $6.50.
597.8 QL668.E2W8 49-1510

An even one hundred American frogs and toads are here presented in very acceptable fashion. The table of contents lists them systematically and gives in three parallel columns where they may be found by account, by plate, and by map. The 37-page bibliography is divided into the general works chronologically arranged, then the check lists or catalogs, followed by the most helpful innovation, — chronologically arranged literature for all the provinces of Canada, states of the U.S.A., and parts of Mexico. The position of the senior author, Dr. Albert Hazen Wright, as Emeritus Professor of Zoology at Cornell University lends a degree of definitiveness to this work that makes it a "must" for the institutional library.

HIGH JUNGLE, by William Beebe, Duell, Sloane and Pearce, 270 Madison Ave., New York 16, N. Y., 1949, 379 pages, $4.50.
591.987 QL251.B4 49-9280

Pointed up with 49 unusual photographs this latest work proves that the famous director of tropical research at the New York Zoological Society still possesses his unique facility of making scientific field work absorbingly interesting. From the vantage point of the unfinished Rancho Grande of the former Venezuelan dictator Gomez, Dr. Beebe and his assistants observed, collected, counted, recorded, and shipped their specimens from the rainforest of the Andean foothills. Meanwhile the author's vivid story of their adventures, makes most delectable reading, —a distinct addition to our ecology of the tropics.

HOW TO INCREASE PLANTS, by Alfred C. Hottes, De La Mare Company, 448 West 37th Street, New York 18, N. Y., 1949, 279 pages, $3.00.
631.53 SB119.H8 Agr. 49-407

For many years following his professorship of Horticulture at Ohio State the author of this practical little volume was associate editor of "Better Homes and Gardens." From the vantage point of this experience he has been able to pack a tremendous amount of accurate information into this volume. All the means of plant propagation, both herbaceous and woody, are carefully presented.

HUNTING, FISHING AND CAMPING, by L. L. Bean, Published by the Author, Freeport, Maine, 1947, 104 pages, illustrated, $1.00.
799 SK33.B42 Agr. 47-257

Biologists used to be ridiculed for their excentricities when out on collecting expeditions. Hunters and fishermen on the other hand have practically monopolized the forests and streams of the continent with much gusto and profit. If hunters and fishermen knew more biology, and if biologists knew how to make themselves comfortable in the woods and on the streams, things would be a lot better all around. This book is therefore presented here for the biologists who want to take a leaf out of the sportsmen's book and do their collecting in comfort.

INDUSTRIAL MICROBIOLOGY, by S. C. Prescott and C. G. Dunn, McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1949, 923 pages, $8.50.
589.95866 QR157.P7 49-49184

This second edition of a standard manual for industrial concerns comes appropriately from the Massachusetts Institute of Technology. It covers not only the usual application of yeast, fermentation and brewing, wine, bacteria and acetone-butanol fermentation, acetic acid bacteria, pickles, cheese, molds, but also antibiotics, textile and wood microbiology. There is also an appendix on the treatment and disposal of microbiological wastes.

INTRODUCTION TO ANIMAL BIOLOGY, by J. B. Parker and J. J. Clarke, The C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo., 1949, 554 pages, $4.00.
590 QL47.P18 49-49277

This is the Third Revised edition of a standard text which first appeared in 1930, and has been repeatedly reedited and reprinted in the succeeding years. The illustrations of which some 172 are presented, are clear and distinct. The enthusiasm with which this work has been accepted is in no small measure due to the two facts that it emanates from the Catholic University of America, and it is consistently evolutionistic in its approach. The book lacks a bibliography of suggested readings or reference works which would make it more helpful, not only to teachers and students, but also to librarians in building up school libraries.

INTRODUCTION TO MICRORGANISMS, by Laverne R. Thompson, W. B. Saunders Co., Philadelphia, Pa., 1949, 454 pages, $4.25.
589.95 QR41.T53 49-4473

Originally appearing in 1944, this text by the assistant professor of nursing education at Columbia University Teacher's College, is accompanied by a 43-page teachers guide especially designed like the textbook to meet the needs of instructors in schools of nursing. It is definitely not a manual for laboratory technicians. The main stress is, therefore, laid on sanitation and prophylaxis.

INTRODUCTION TO PARASITOLOGY, by A. C. Chandler, John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y., 1949, 756 pages, $6.00.
616.961 RC220.C5 49-6754

This is the eighth edition of one of the best known textbooks of parasitology that American education has ever produced. It's first edition in 1918 was by nature of being a trail-blazer. The rapid growth of the science, especially during and since World War II has materially increased our knowledge of pathogenic organisms. The author has wisely refrained from trying to treat them all, or very extensively. All through the book the approach is clinical rather than hylogenetic.

INTRODUCTION TO RADIOCHEMISTRY, by G. Friedlander and J. W. Kennedy, John Wiley and Sons, 440 Fourth Ave., New York 16, N. Y. 1949, 412 pages, $5.00.
541.38 QD601.F7 49-9979

This was the first book on the subject to come out since before the war. It grew out of an introductory course originally presented to the student-workers at Los Alamos in pre-atom-bomb days and since continued at Washington University by the junior author. Among other topics the thirteen chapters treat successively of atomic nuclei, nuclear reactions, bombarding particles, radioactive decay, instruments for radiation detection, statistics of radioactivity measurements, techniques for measurements, identification of radioactive species, traces in chemical applicators. Each chapter is followed by a number of review questions.

IRRIGATED SOILS: THEIR FERTILITY AND MANAGEMENT, D. W. Thorne and H. B. Peterson, The Blakeston Co., 1012 Walnut St., Philadelphia 5, Pa., 1949, 288 pages, $5.00.
631.7 SB112.T48 Agr. 49-110

This is definitely a management and technical manual on handling the problems of irrigation. Nevertheless the book is so written that students with hardly more than freshman level preparation in other basic science, can grasp it; however, he should have had a general course in soils. There are some 74 good illustrations and 64 tables. There is also an appendix with chemical symbols, equivalents, formulae and factors.

LABORATORY AND FIELD MANUAL OF ORNITHOLOGY, by Olin Sewall Pettingill, Jr., Burgess Publishing Co., 426 South Sixth St., Minneapolis 15, Minn., 1948, 247 pages, 20 plates, $3.50.
598.2072 QL677.5P4 48-3835

This spirally bound laboratory and field manual is the result of several years teaching at Carleton College and the University of Michigan Biological Station. It should be a valuable adjunct to any course in which a practical approach to ornithology is desired. The daily field checklist of the birds of North Central U.S. which accompanies it (courtesy of the publishers) make one impatient for Spring.

MAMMALS OF WASHINGTON, by Walter W. Dalquest, Museum of Natural History, University of Kansas, Lawrence, Kansas, 1948, 444 pages, 140 figures.
599 QH7.K3 48-45341

While the major part of this work is descriptive of the 230 mammalian species and subspecies indigenous to Washington, there is a 112 page preliminary discussion in which the following pertinent topics are treated: physiographic provinces of the state, distributional areas, climate and vegetation, life-zones and ecology, geologic history, faunas, speculations on emigrational and distributional history of the mammals in the state.

MAN IN THE PRIMITIVE WORLD, by E. Adamson Hoebel, McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y., 1949, 543 pages, $6.00.
572 GN315.46 49-4731

This entirely new textbook for introductory anthropology is so interestingly written that the curious reader finds it difficult to lay it down. Since most textbooks fail to challenge student interest (except for the most unusually gifted) this manual thereby merits a most unique position. The author is scientific enough—the foot notes are copious in every chapter, there are fourteen pages of up-to-the-minute bibliography,—there is even a 14-page glossary,—yet he has courageously attempted to present his interesting material in a definitely personalized style. In the opinion of this casual reader, his textbook is all the better for it.

OUR GEORGIA-FLORIDA FRONTIER, THE OKEFINOKEE SWAMP, ITS HISTORY AND CARTOGRAPHY, by Albert H. Wright, Published by the Author, Ithaca, N. Y., 1945, 189 pages, 24 plates, $2.50 paper, $3.00 cloth.
975.9 F292.05W7 47-1710

This book has been a long time coming to our notice. Anyone who has informed himself of this wildest part of the American wilderness will want this volume. To those who have read Louise Matchat's "Suwanee River" in the Rivers of America series, this book will come as a revelation of the mass of historic data available regarding one of America's greatest remaining collecting grounds.

POCKET GOPHERS OF UTAH, by Stephen Durrant, University of Kansas Press, Lawrence, Kansas, 1946, 82 pages, 1 map.
599.32(574.074) QH7.K3 46-27440

This monographic on the Thomomys lists thirty-five subspecies of which eleven belong to the species *talpoides* and twenty-four to the *bottae*. Two of the former and five of the latter are new subspecies.

PRINCIPLES OF HUMAN GENETICS, by Curt Stern, W. H. Freeman and Co., 549 Market Street, San Francisco 5, Calif., 1949, 617 pages.
575.1 QH431.S714 49-48312

This new text, by the professor of Zoology at the University of California, Berkeley, is more than a mere textbook. It aims to supply those professionally interested as well as the so-called "general" student. In practice it has been presented as an alternate to the stereotyped course in genetics. The book is illustrated with nearly 200 figures, 99 tables.

SCIENCE AND IMAGINATION IN SIR THOMAS BROWNE, by Egon S. Merton, King's Crown Press, Columbia University, New York, N. Y., 1949, 156 pages, $2.50.
828.3 PR3327.M4 A49-7274

This paper-bound book is a running commentary on the works of that famous British writer whose "Religio Medici" and "Hydrotaphia" are familiar works to anyone who has ever taken a survey course in English literature. Merton treats Browne's works from three different angles, as to their science, their philosophy, and their art. The book is copiously annotated.

SCIENTIFIC FILMS AND FILM STRIPS

In the course of the discussions at at the Phi Sigma Meetings in Albuquerque a year ago, someone asked if there was any definite source from which information could be gathered on films available for meetings.

There is,—and a perfect plethora of ideas can be gleaned from a rather compendious volume entitled "Educator's Guide to Free Films." It is compiled and edited by Mary Foley Horkheimer and John W. Diffor, and published by the Educators Progress Service, Randolph, Wisconsin. The ninth annual edition which came out in 1949 sold for $5.00 a copy, which is not exhorbitant for a book of such limited appeal. Some 1716 films were described, together with the addresses of the companies and the conditions under which the films are loaned.

Of the film listings there were some nine pages of biological interest, fifteen of chemical, thirteen of physical, as well as numerous others in general science. There are some five additional pages of listings on conservational lines, and twenty-seven agricultural (including soil conservation). This volume is issued annually, so it is only fair to suspect that additional titles have been added to this year's listings. Those who are really interested in this very fruitful line may want to secure and consult the following additional publications which contain items not all of which are listed in the foregoing masterwork:

"*Planning Films for Schools*," Mark A. May, American Council on Education, 744 Jackson Place, Washington 6, D. C. This is the final report of the Commission on motion pictures. It covers the background and points up the importance of the use of visual aids in education.

"*U. S. Government Films for School and Industry*," Castle Films, 542 Dearborn St., Chicago, Illinois. Here are described some 1964 films available for purchase.

"*Education and Entertainment by Motion Pictures*," Edited Pictures System, 165 West 46th St., New York 19, New York. Seven films of direct biological interest are included, for sale, or, if necessary, for rental.

"*Encyclopaedia Britannica Classroom Films*," Research Dept., Wilmette, Illinois. Ask for the issue of "Films Recommended for Use at the College Level."

"*Institutional Cinema Service, Inc.*," 1560 Broadway, New York 19, New York. Lists 83 titles under Natural Science with other interesting items under the headings of Physical Science, Physiology, March of Time, etc.

"*Index and Guide*" to free educational and classroom films, Modern Talking Picture Service, 9 Rockefeller Plaza, New York 20, New York. Lists 58 items, several of biological interest or importance.

British Information Service, 30 Rockefeller Plaza, New York 20, New York. With other distribution centers in Chicago, San Francisco and Washington, this agency has a wide range of useful material, of which the most interesting biologically come under the headings of Food and Agriculture, Health and Medicine, Scientific and Technical.

U. S. Department of Conservation, 434 N. Plankinton Ave., Milwaukee, Wisconsin. A wide range of most useful and interesting films.

"*Motion Pictures of the U.S.D.A.*" Miscellaneous Publication No. 673, for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 15¢. Lists all the Department of Agriculture presentations, both in film and film strips or slides, as well as the lending depositories in the U.S.A. from which they may be secured.

In addition to the foregoing, there are some agencies which specialize in film strips or slides, kodachromes, etc., which are helpful in illustrating a lecture of course as occasion arises. Among the concerns specializing in this field we have discovered and can vouch for the excellence of the work being done by at least two producers of 2" x 2" color slides. The American Biological Culture House, of Charleston, Illinois, puts out several sets of good kodachromes of ecological, bacterological and botanical importance. Plant taxonomists will, we think, appreciate the gorgeous color photography done by Carl B. Obrecht of 726 Gladstone, Detroit 2, Michigan. We have not yet had a chance to see any of the very extensive listings of the College Biological Supply Co., 9230 Woodlawn Ave., Seattle 3, Washington. Their 29 page catalog, "Kodachromes of the West," contains an intriguing roster of plants and animals listed by taxonomic families, as well as some 22 sets of scenic pictures of the parks and beauty spots of the West.

In the film strip field those who are interested may want to write for one or all of the following:

Photo Art Visual Service, 840-44 N. Plankington Ave., Milwaukee 3, Wisconsin. Offers Filmstrips, Slides and Recordings.

Slide Films of the U.S.D.A., Miscellaneous Publications No. 655, U.S.D.A., published by Motion Pictures Service, U. S. Department of Agriculture, Washington 25, D. C.

Filmstrip Guide, the H. W. Wilson Company, 950 University Ave., New York 52, New York. Last September this company began publication of a monthly list of new releases. The subscription price is $3.00 for ten issues a year.

Those who are interested in making their own lantern slides will want to secure for a showing the film recently produced by the Audio-Visual Center of Indiana University, Bloomington, Indiana. It is titled "How to Make Handmade Lantern Slides." It has been released to most of the state free distribution agencies. If you cannot secure it through yours, write directly to the above address for further information.

Wards Natural Science Establishment, 3000 Ridge Road East, Rochester 9, New York, has put out a series of six Woodcraft Kodachromes and scripts which will be not only interesting, but downright helpful to those biological students who hold, or plan on holding positions as counsellors in summer camps or in scouting or playground work. The folder is worth sending for.

▽

The New Freshman

In certain fundamental but intangible respects, however, it is different this year, at least different from two or three years ago. This class looks younger and it is younger. There are among them only eight veterans, only one or two of whom saw active war service. Three years ago we felt that a substantial portion of our freshmen had already reached maturity, that they were here to nurture by reflection and learning a mind already aware of fundamental human issues, for they had seen much of life and many of them had suffered. One cannot feel the same about college men coming to us directly out of their high schools and preparatory schools. Our function as teachers has changed in the sense that it is more important than it has been in recent years that the college atmosphere should condition those fundamental attitudes and feelings which form the basis of wise judgment and good citizenship.

This throws an added burden on the liberal college, one to be sure which to some degree it has always tried to assume.—Pres. Victor L. Butterfield, in The Wesleyan Univ. *Alumnus*.

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Council Representative—Dr. Fredrick Zeiner, 1417 South Elizabeth, Denver 10, Colorado.

ZETA

—University of Wisconsin

President—Robert Sirny, Biochemistry Bldg., Univ. Wis., Madison 6, Wis.

Corresponding Secretary—Carol Nieland, Biology Bldg., Univ. Wis., Madison 6, Wis.

Recording Secretary—Sam Wiggans, Biology Bldg., Univ. Wis., Madison 6, Wis.

Treasurer—Milton Sunde, Poultry Husbandry, Temp. Bldg. 20, Univ. of Wis.

Editor—Maurice Futrell, Plant Pathology, Univ. of Wisconsin.

Council Representative—O. N. Allen, Dept. of Bacteriology, Univ. of Wisconsin.

Professor H. F. Harlow, of the Department of Psychology addressed an open meeting of the Zeta Chapter on December 15, 1949. His topic of discussion was "Monkeys That Think." Professor Harlow reviewed some of the recent research in the field of psychology at Wisconsin. His talk was illustrated with slides and movies.

ETA

—University of Akron

President—William Stockton, 1468 Manchester Rd., Akron, Ohio.

Vice-President—James Cole, 332 Spicer St., Akron, Ohio.

Corresponding Secretary—John Jacob, 1994 Manchester Rd., Akron, Ohio.

Treasurer—Frank Bland, 918 Winton Ave., Akron, Ohio.

At the first regular meeting of Eta chapter held on September 27, 1949 at the University of Akron, new officers were elected for the school year 1949-50.

Three new candidates were proposed for membership, two active and one faculty member. The active members proposed were Frank Bland and Barbara Barnes. Dr. Abraham Cantor was proposed for faculty membership. He is the new head of the Bacteriology Department.

On October 23, these three members were initiated into the Society at the home of Dr. Walter C. Kraatz, our faculty advisor.

On October 27, a short business meeting was held at the University mainly for the purpose of electing a treasurer to fill the office which Mr. Cole was holding together with the Vice-Presidency. Frank Bland was elected to this office.

Our former secretary, Miss Nina Mamay, was married to Professor Alvin Richards of the University of Akron's engineering department. She is now employed as an assistant in Bacteriology in the evening session at the university and a full time bacteriologist in the City Health Department Lab.

Bill Meese, former President, is Director of Audio Visual Aids at the University.

Robert Baker, former Treasurer, is now taking graduate work at Ohio State University in Biology.

Concerning our other former members, Eugenia Mamay, who took a Master's in Library Science at Western Reserve University, is now employed at Fort Meade as a technical librarian.

John David is an assistant instructor in Botany at the University of Rochester.

KAPPA

—University of Kansas

President—John Ott, Bacteriology Dept., Univ. of Kansas, Lawrence, Kansas.

Vice-President—Lewis Goyette Botany Dept., Univ. of Kansas, Lawrence, Kansas.

Corresponding Secretary—Keith Jensen, Bacteriology Dept., Univ. of Kansas, Lawrence, Kansas.

Recording Secretary—Dorothy Taft, Botany Dept., Univ. of Kansas, Lawrence, Kansas.

Treasurer — Roy Peterson, Anatomy Dept., Univ. of Kansas, Lawrence, Kansas.

Editor—Paul Christian, Entomology Dept., Univ. of Kansas, Lawrence, Kansas.

LAMBDA

—University of Montana

President—Charles Pase, 1034 Taylor, Missoula, Montana.

Vice-President—Robert Damon, Jumbo Hall, Missoula, Montana.

Corresponding Secretary—Milton Van Camp, South Hall, Missoula, Montana.

Recording Secretary—Pat Rainey, New Hall, Missoula, Montana.

Formal initiation took place on November 18; eleven new members were initiated at a banquet at the Trails Inn in Hamilton, Montana. During the afternoon before the banquet, members and guests of Lambda chapter toured the Rocky Mountain Laboratory, also located in Hamilton. It is in this laboratory that many experiments have been carried on with diseases transmitted by arthropods. At the present time the laboratory manufactures much of the yellow fever vaccine produced in the United States.

Our guest speaker at the banquet was Dr. Cornelius Phillip of the Rocky Mountain Laboratory. Dr. Phillip gave a very interesting account of his work on scrub typhus in the South Pacific area during and after World War II. Of special interest was the remarkably rapid cure of the victims of scrub typhus through the use of the new drug, Chloromycetin.

NU

Washington and Jefferson College

President—Philip R. Nast, 298 E. Beau St., Washington, Pennsylvania.

Vice-President—James A. Wiseman, 166 S. Wade Ave., Washington, Pa.

Corresponding Secretary
Recording Secretary—Both - Robert L. Boord, 150 E. Maiden St., Washington, Pa.

Treasurer—Harold L. Brodell, Dorm No. 2, Room No. 3, W. & J. College, Washington, Pa.

Editor—Richard F. Ruben, 202 E. Beau St., Washington, Pa.

Council Representative—........ ....

PI

—Emory University

President—J. Dan Bateman, Box 265, Emory University, Georgia.

Vice-President—Dorothy Quillian, 1750 N. Decatur Rd., N.E., Atlanta, Georgia.

Corresponding Secretary — Albert A. Creed, Box 642, Emory University, Georgia.

Recording Secretary — Thomas M. Smith, 1800 N. Decatur Rd., N.E., Atlanta, Georgia.

Treasurer—Joe L. Bussey, Box 422, Emory University, Georgia.

Editor—Jean Osborn, Agnes Scott College, Decatur, Georgia.

Council Representative — Dr. H. M. Phillips, Dept. of Biology, Emory Univ., Emory University, Georgia.

Pi Chapter opened Fall Quarter activities with a membership meeting, approving five faculty members and thirty-four students for membership.

Dr. W. D. Burbanck and Dr. A. C. Clement spoke before the group November 10 on the Biological Laboratory at Woods Hole, Massachusetts.

New members were initiated into Pi Chapter December 1. Following the initiation ceremony, members and new initiates attended an informal banquet in the University Cafeteria. Speaker of the evening was Dr. A. P. Richardson, Professor of Pharmacology, Emory University School of Medicine.

Pi Chapter closed the quarter with an open meeting for all Biology Concentration students. Dr. J. A. Miller, Anatomy professor at Emory Dental School, talked on a series of pictures by Dr. C. C. Spidel showing the activities of living cells.

Faculty members initiated were: Anna Josephine Bridgman, Anthony Calhoun Clement, Charles H. Driver, Joseph Vireld Michalski, Arthur Pawley Richardson,

Student members initiated were: Henry Duane Blair, Coleman Meredith Brown, Barbara Ann Caldwell, Ralph Edward Calhoun, Gerald Eugene Caplan, Anthony Calhoun Clement, Betty Jane Crowther, Adrian Clyde Davis, Thomas Coston Dickinson, Thomas Anthony Engle, Frank Pickett Fletcher, Waldo Emerson Floyd, Jr., Thomas Charles Frederickson, Morton Ernest Getz, Joseph Martin Good, Jr., Elizabeth Ann Griggs, Benjamin Hausman, John Munn Heng, Elmore Gray Herbert, William Forrest Hutchison, William Dixon Ivey, Wilbur Douglas Jones, Jr., William Stonley Lanford, James Lawton Lodge, Jr., Jack Landis McGowan, Larry Lee McKinney, Aloysius Ignatius Miller, Wendell Keith O'Steen, William Luther Peacock, Jr., John Erwin Penland, Jr., Emily Ann Reid, Frank Alfonso Rizza, Warren Young Smith, Ruth Jenelle Spear, Edward Ferguson Taylor, Jr.

RHO

—University of Illinois

President—George H. Burnett, 467b Noyes Lab., Univ. of Illinois, Urbana, Ill.

Vice-President—Irving B. Sachs, 338 Nat. Hist. Bldg., Univ. of Ill., Urbana, Ill.

Corresponding Secretary—John W. Hall, 205 Harker Hall, Univ. of Ill., Urbana, Ill.

Recording Secretary—William B. Robertson, 203 Vivarium Bldg., Univ. of Ill., Urbana, Ill.

Treasurer—James M. Barrett, 338 Nat. Hist. Bldg., Univ. of Ill., Urbana, Ill.

SIGMA

—University of Florida

President—Julius E. Bearman, P. O. Box 551, Gainesville, Florida.

Vice-President—James R. Christie, Plant Pathology Dept., Univ. of Fla., Gainesville, Fla.

Corresponding Secretary—M. Lewis Wright, Jr., P. O. Box 2359, University Station, Gainesville, Fla.

Recording Secretary—Chancellor I. Hannon, Box 2184, Univ. Station, Gainesville, Florida.

Treasurer—William F. Oliver, Jr., Box 2318, Univ. Station, Gainesville, Florida.

Editor—Edward H. Michelson, Dept. of Biology, Univ. of Florida, Gainesville, Florida.

UPSILON

—Miami University

President—Owen D. Larrison, 24 South Main St., Oxford, Ohio.

Vice-President—Robert J. Gardner, 201 N. Main St., Oxford, Ohio.

Corresponding Secretary—Marilyn Jacoby, 211 Hamilton Hall, Oxford, Ohio.

Recording Secretary—Mary Margaret Miller, 312 Hamilton Hall, Oxford, Ohio.

Treasurer—Chester Nameth, 301 W. High, Oxford, Ohio.

Editor—Anita Pape.

Council Representative— ....

PHI

—University of New Hampshire

President—Philip St. John, East Hall, Durham, New Hampshire.

Vice-President—Virginia Quinn, Alpha Chi Omega, Durham, New Hampshire.

Corresponding Secretary—Jane Shaw, Alpha Xi Delta, Durham, New Hampshire.

Recording Secretary—Arlene Roy, Alpha Chi Omega, Durham, New Hampshire.

Treasurer — Larry Staples, Nesmith Hall, Durham, New Hampshire.
Editor—..............................
Council Representative — Prof. C. F. Jackson, Nesmith Hall, Durham, New Hampshire.

CHI
—Montana State University

President—John C. Donohoe, 18 E. Street, Bozeman, Montana.
Vice-President—Peg Fisher, Quad E MSC, Bozeman, Montana.
Corresponding Secretary — Earle M. Douglas, 404 W. Arthur, Bozeman, Montana.
Recording Secretary—Pat Miller, Quad D MSC, Bozeman, Montana.
Treasurer—Mike Britton, 20 Cedar, Bozeman, Montana.
Council Representatives—Cliff Davis, 730 S. Tracy, Bozeman, Montana and William Walter, 1201 S. 3rd, Bozeman, Montana.

The Montana State College chapter of Phi Sigma, national biological honor society, is initiating a program of cooperation between the College and the high schools of Montana in the biological sciences.

The purpose of this program will be to promote an interest in the collecting of biological specimens in order to build up the collections both at the College and in the participating high schools. It is our hope that, when sufficient materials have been collected, a specimen exchange between schools and also a series of traveling exhibits can be established.

The sciences which this organization is equipped to handle include Archeology, Bacteriology, Botany, Entomology, Paleobotany, Paleonotology, Wild Life and Zoology. A set of collecting instructions, preparation methods, proper labeling instructions, etc., in pamphlet form is planned for each of these sciences in the near future.

In addition to the above mentioned pamphlet, the sponsoring group is equipped to do classification of specimens and to answer questions of a biological nature when these answers are not readily available in the literature at the high school's disposal.

It is hoped that this program can get under way this spring with demonstrations which may be seen at the open house during High School Week on April 29, 1949. These demonstrations are planned to include the use of collecting tools and methods of specimen preparation in the biological sciences. In addition there will be further information available at that time concerning this program.

In a letter to the high schools these questions were asked:

"Phi Sigma Society would appreciate answers to the following questions:

(1) Would your school be interested in participating in this program?

(2) We understand that some of your students may attend High School Week here; if so, are any of them particularly interested in any of the biological sciences?

(3) Would your school be interested in exchanging duplicate specimens of biological materials with other schools?"

PSI
—University of Washington

President—Wesley Volk, 607 E. 45th, Seattle, Washington.
Vice-President—Zella Short, 5216 E. 74th, Seattle Washington.
Corresponding Secretary—Eva LeCocq, 5021 Brooklyn, Seattle, Washington.
Recording Secretary—Florence Harrison, 2215 N. 37th, Seattle, Washington.
Treasurer—Patricia Knight, 5611 Latona, Seattle, Washington.
Editor—Allyn Seymour, 4747 48th N.E., Seattle, Washington.
Council Representative— ....

OMEGA
—University of Oklahoma

President—Paul B. McCoy, 411 Park Drive, Norman, Oklahoma.
Vice-President—Russel Faulkner, 703 Asp, Norman, Oklahoma.
Corresponding Secretary—Joella Campbell, 640 Elm Street, Norman, Oklahoma.
Recording Secretary—Patricia Bynum, Faculty Exchange, O. U., Norman, Oklahoma.
Treasurer—Bill Crittendon, 607 Lahoma, Norman, Oklahoma.
Editor—Mary F. Smith, Zoology Bldg., Norman, Oklahoma.

ALPHA ALPHA
—University of Southern California

President—Wilbur L. Brandt, Box 109, Univ. of So. Calif., Los Angeles 7, California.
Vice-President—Howard Winter, Box 109, Univ. of So. Calif., Los Angeles 7, California.
Corresponding Secretary—Newton Stafford, Box 109, Univ. of So. Calif., Los Angeles 7, California.
Recording Secretary—Isabelle Pressler, Box 109, Univ. of So. Calif., Los Angeles 7, California.
Treasurer—Anna Shirer, Box 109, Univ. of So. Calif., Los Angeles 7, California.
Council Representative—Mrs. Tema S. Clare, Box 109, Univ. of So. Calif., Los Angeles 7, California.

ALPHA BETA
—Mount Union College

President—William O. Wild, 759 Parkway Blvd., Alliance, Ohio.
Vice-President—Susan Everhard, R.F. D. 1, New Philadelphia, Ohio.
Recording Secretary—Mary Bennett, 13 Worcester Street, Grafton, Massachusetts.
Treasurer—Daniel Kibler, 684 E. Main, East Palestine, Ohio.
Editor—William Dawson, 18 Dawson Court, Bedford, Ohio.

Chicago, Ill., (Special)—Milton Herbert Hood of Youngstown, Ohio, Phi Sigma at Mount Union College in Alliance, Ohio, (B.A. '49) is one of 56 outstanding graduate students from 19 countries who have been awarded Rotary Foundation Fellowships for overseas study in 1949-50 by Rotary International, world-wide service club organization.

He sailed from New York on September 26th on the "Mauretania" for Ireland, where his major field of study at the University of Dublin during the 1949-50 school year will be education. Following his return to the United States, he plans to begin a teaching career.

Mr. Hood was born in Youngstown, is 22 years old and single. He is the son of Mr. and Mrs. Robert Hood of Youngstown. His application for the fellowship was sponsored by the Rotary Club of Alliance, Ohio.

During World War II, he served in the United States Army in 1945 and 1946.

ALPHA EPSILON
—University of Pittsburgh

President—Dr. Leroy Black, 2035 Beechwood Blvd., Pittsburgh 6, Pa.
Vice-President—Richard T. Hartman, 543 S. Graham St., Pittsburgh, Pa.
Corresponding Secretary—Irene M. Boccella, 6107 Alder St., Pittsburgh 6, Pa.
Recording Secretary—Lillian Phillips, 22 Harrison St., Pittsburgh 5, Pa.
Treasurer—Dorothy Long, Fairfax Apts., Pittsburgh 13, Pa.
Editor—Jane Freedman, 705 S. Braddock Ave., Pittsburgh 21, Pa.
Council Representative—Dr. Peter Gray, Dept. of Biological Sciences, Univ. of Pittsburgh.

ALPHA ETA
—Oklahoma A. & M.

President—Joe Dixon, Box 491 Vet Village, Stillwater, Oklahoma.
Vice-President—Glen Clefish.
Corresponding Secretary—Elizabeth Darby, 250 Willard Hall, Stillwater, Oklahoma.
Treasurer—Harold Kidd, 701 West St., Stillwater, Oklahoma.
Editor—Frank Benton, Jr., 7 Cheyenne Vet Village, Stillwater, Oklahoma.

ALPHA IOTA
—Bucknell University

President—Milan Drake, Bucknell University, Lewisburg, Pennsylvania.
Vice-President—Charles Rahner, Phi Kappa Psi, Lewisburg, Pennsylvania.
Corresponding and Recording Secretary—William H. Bachman, 30 S. Front St., Lewisburg, Pennsylvania.

ALPHA KAPPA
—Hunter College

President—Hilda Weyl, 900 Summit Ave., Bronx 52, New York.
Vice-President—Esther Balken, 733 W. 183 St., New York 33, N. Y.
Recording Secretary—Marjorie Spencer, 1419 Franklin, Ave., Bronx 56, New York.
Treasurer—Claire LeJeune, 135-17 117 Ave., Queens, New York.
Editor—John Wolff, 130 Fort Washington Ave., New York 32, N. Y.
Council Representative—Dr. Harold H. Clum, Biology Dept., Hunter College, or 695 Park Ave., New York, N. Y.

On May 12 Dr. Wendell H. Camp of the New York Botanical Garden was our guest speaker, and delivered an interesting and entertaining lecture on "The New Systematics."

Dr. Camp introduced his, and his colleague's new ideas on plant classification which greatly stress the importance of the latest developments in plant genetics, facts unknown to the early plant classifiers whose system is still used today. He used the azaleas and violets as examples of generea in which the delimination of species is made particularly hard due to the effects of environment on the spreading of genetic factors so that the result is a broad genetic plexus in which it is difficult to determine species.

At a ceremony at the Allerton House Hotel on May 22 the following members were initiated in Alpha Kappa Chapter: Robert Alexander, Esther Balken, Joan Frasse, Murray Friedman, Irma Garruls, Ethel Goldstein, Robert Gustafson, Claire Le Jeune, Martin Marcus, Elvira Mattarese, Dolores Paganelli, Gertrude Ritter, Martin Rogoff, Myra Rose, Alice Rosen, Joan Shapiro, Marjorie Spencer, Ruth Stern, Elinore Swart, Annabelle Syrop, Grace Testa, Winifred Walsh, John Wolff.

At a meeting on October 18 it was decided to modify the requirements for admission of new members, because the raised standards established last spring would have kept away nearly all those interested in joining the society. By a compromise between the new requirements and those previously in effect we hope to recruit members who will continue to show an interest in the society's and chapter's activities beyond the date of their graduation. It was the requirement of a short paper of library research on a biological subject, designed to prove a candidate's willingness to take an active part in the chapter, that frightened most potential members from seeking admission. Our rules were therefore changed to require a paper only of those whose academic average in all subjects and in biological sciences in particular were slightly below the newly established minima.

This term, under the guidance of Prof. Hammond, a small group of active members who are able to afford the time is continuing the chapter's project, begun last semester, of a study of staining techniques of chromosomes of Drosophila.

On October 28 Dr. H. Moldenke of the New York Botanical Gardens gave a lecture before the chapter on "Plants of the Bible," illustrated with beautiful colored slides. In his highly stimulating talk Dr. Moldenke displayed a profound knowledge of the botany of the Holy Land and of Biblical history, both complex subjects liable to many different interpretations. The speaker gave numerous examples of the confusion created by translators of the Bible who lacked botanical training. For instance, the "dancing roses" of Isaiah were daffodils, the "rose of Sharon" could be only the Sharon tulip, while the "rose" mentioned as growing along watercourses is most probably our oleander. The audience was surprised to hear that the "apple" of the Garden of Eden was in fact an apricot. The "lilies of the field" growing not only on the Mount of Olives but everywhere in Palestine are Palestinian anemonies, while the "lily" of the Book of Solomon corresponds to the blue hyacinth. The speaker gave an interesting explanation of the phenomenon of manna falling from the sky: "manna" could refer to a tree gum, to Nostoc, or to a lichen growing on mountain tops. The last when dry breaks off the ground and is easily carried by the wind for thousands of miles. Dr. Moldenke's lecture had great cultural as well as scientific value in that he explained the uses of many spices, fruits and woods in Biblical times. He also discussed the symbolism attached to many Scriptural plants, such as the date palm which signified triumph, cedar which connoted grandeur and strength, or the laurel, a symbol of wealth. The audience was grateful to Dr. Moldenke for an erudite lecture enlivened by a subtle sense of humor.

The following new members were initiated into Alpha Kappa Chapter on January 25, 1950:

Selma Blau, Morris D. Caplin, Vera Holmstrom, Elizabeth Marie King, Alice Stahl, Ellen Tannenbaum, Muriel Wicker, Norma Yonitelli.

At the same meeting it was noted unanimously to accept the requirements for affiliation with the Association of College Honor Societies. These requirements are that the college must be accredited and that members be elected from the upper 35% of their class.

ALPHA LAMBA
—University of Utah

President—Earl W. Smart, Dept. of Vertebrate Zoology, Univ. of Utah, Salt Lake City, Utah.
Vice-President—Ian L. Bell, Dept. of Invert. Zool., Univ. of Utah, Salt Lake Sity, Utah.
Corresponding Secretary—Mrs. Betty G. Woodbury, Dept. of Entomology, Univ. of Utah, Salt Lake City.
Recording Secretary—Roy P. Thelander, Dept. of Genetics, Univ. of Utah, Salt Lake City.
Treasurer—Glen C. Collett, Dept. of Entomology, Univ. of Utah, Salt Lake City.
Council Representative—Dr. Albert W. Grundmann, Dept. of Invert. Zoology, Univ. of Utah.

On a recent trip to the Rockies the chancellor, Dr. A. I. Ortenburger, addressed a meeting of the Chapter and spent some time with the officers and council representatives.

ALPHA MU
—University of Oregon

President—Leo E. Jones, Botany Dept., Oregon State College, Corvallis, Oregon.
Vice-President—William C. Burns, Zoology Dept., Oregon State College, Corvallis, Oregon.
Corresponding Secretary—C. R. Amen, Entomology Dept., Oregon State College, Corvallis, Oregon.
Recording Secretary—E. K. Morton, Fish and Game Dept., Oregon State College, Corvallis, Oregon.
Treasurer—D. G. Dunlap, Zoology Dept., Oregon State College, Corvallis, Oregon.

ALPHA NU
—University of New Mexico

President—H. C. Cox, 607 West Los Griegos Road, Albuquerque, New Mexico.
Vice-President—Robert Wheat, 309 So. Yale, Albuquerque, N. M.
Corresponding Secretary—Robert Stubbs, Box 245, Univ. of New Mexico, Albuquerque, N. M.
Recording Secretary—Peggy Emmel, Marrow Hall, U.N.M., Albuquerque, N. M.
Treasurer—Frank Viquesney, 1012 West Central, Apt. C, Albuquerque, N. M.
Editor—Scott Adler, 419 No. Maple, Albuquerque, N. M.

ALPHA XI
—Rhode Island State College

President—John Lowney, Zoology Dept., R.I.S.C., Kingston, Rhode Island.
Vice-President—Lafayette Fredericks, Botany Dept., R.I.S.C., Kingston, R. I.
Corresponding Secretary—Mary Ann Ferrigno, 131 Eleanor Roosevelt Hall, R.I.S.C., Kingston, R. I.
Recording Secretary—Esther Depardo, Alpha Delta Pi, R.I.S.C., Kingston, R. I.
Treasurer—Gabriel Surabian, care of Dean Campbell, 48 North Road, Kingston, R. I.

ALPHA OMICRON
—Marquette University

President—Jack Stracke, 925 N. 18th St., Milwaukee, Wisconsin.
Vice-President—Howard Suzuki, 1682 N. Marshall St., Milwaukee, Wisconsin.
Corresponding Secretary—Lois Bell, 2333 N. Murray Ave., Milwaukee, Wisconsin.
Recording Secretary—Rosemary Ulrich, 2336 W. Juneau, Milwaukee, Wisconsin.
Treasurer—Vernon Coty, 1621 N. Prospect Ave. No. 8, Milwaukee, Wisconsin.
Editor—Jacqueline Roddy, 2336 W. Juneau, Milwaukee, Wisconsin.
Council Representative—Dr. E. S. McDonough, Biology Department, Marquette Univ., Milwaukee, Wis.

The Alpha Omicron Chapter of Phi Sigma held its annual Christmas party on December 20 at Lisette Lodge. Mr. Robert Ritzenthaler Ph.D., assistant curator of Anthropology at the Milwaukee Public Museum, gave an enlightening talk on the customs of "Micronesian People." Colored motion pictures provided vivid illustrations. Preceding the talk, eight new members were formally initiated into the society.

They are: Eugene Donahue, Mary Gerhardt, Mary Nimlos, Beatrice Rausch, Gertrude Schloer, Merlin

Schwertfeger, Alex Stavitz, John Wisniewski.

At the following meeting, January 10, Mr. D. W. Penn of The Red Star Yeast and Products Co. spoke concerning "Some Aspects of the Genetics and Cytology of Yeast."

The Chapter is looking forward to the annual Phi Sigma lecture to be held on March 19, at which time Prof. James A. Raniers of Notre Dame University will speak. An article concerning his work on the development of animals in germ-free environments recently appeared in an issue of *Life* magazine.

Our program for the school year:

Tuesday, October 18, 1949
"The role of oriented cells in the ectodermal layer of the chick limb."
Dr. John Saunders, Biology Dept., Marquette University.

Tuesday, November 20, 1949
"Tissue reactions to physical forces."
Dr. Walter Zeit, Professor of Anatomy and Director of the Department of Anatomy, Marquette University School of Medicine.
Election of candidates for membership.

Tuesday, December 20, 1949
"Micronesian People."
Mr. Robert Ritzenthaler, Assistant Curator of Anthropology at the Milwaukee Public Museum.
Initiation of new members. Refreshments.

Tuesday, January 10, 1950
"Some aspects of the genetics and cytology of Yeast."
Mr. Donald W. Penn of the Red Star Yeast and Products Co.

Tuesday, February 21, 1950
"Some cytological pecularities in the Pteridophytes."
Dr. Douglas Dunlop, Biology Dept., University of Wisconsin, Milwaukee.
Election of new members.

Sunday, April 16, 1950, Medford Hotel
Annual Phi Sigma Banquet
Speaker—Dr. A. M. Keefe, Editor of the *Biologist*.
Initiation of new members.

Tuesday, April 25, 1950
Laboratory Demonstration of Research.
Election of Officers.

Sunday, May 14, 1950, Jackson Park
Annual Phi Sigma Picnic.

ALPHA PI
—University of Colorado

President—Joseph Hall, 1500 Baseline Road, Boulder, Colorado.
Vice-President—Mrs. Barbara McBrien, 1703-14th St., Boulder, Colorado.
Corresponding Secretary — Theodora Downie, 1165 Broadway, Boulder, Colorado.
Recording Secretary—Amelia Potochnik, Room 231, Women's Club, Univ. of Colo., Boulder, Colo.
Treasurer—Dean Girard, 811-9th St., Boulder, Colo.
Editor—Adair Fehlman, 1331 Marshal St., Boulder, Colorado.

One of the activities of Alpha Pi involves a tea each spring for biology students. At the tea an award is made to the outstanding student in Freshman Biology. Of course there have to be talks. Last year Martin W. Fleck was asked to talk for five minutes.

The Chapter asked that he send a copy of the talk to the "Biologist." Here it is:

"In your biology courses you have been taught many things. You have been told that

1) you must have a critical attitude;
2) the universe is orderly and so events follow a cause and effect relationship, and so superstition as explanation is never necessary;
3) you must have a mind free of preconceived prejudice and bias if you are to properly interpret observations which you make.

"As educated biologists it is your duty to take these concepts into your community life with you. If you do this you will analyze data before accepting ideas as representing facts or truth. You will realize that you should accept only the opinion of those who are qualified to express an opinion. If every one would be critical we would have no need to worry about the activities of the anti-vivisectionists impeding medical progress; we would have no need to fear that the vicious philosophy of Communism would infiltrate out society to the point where search for truth is seriously hindered; and we would have no need to worry about the deliberately misleading advertising of such things as certain reducing nostrums designed for gullible ladies of ample girth and ample purse.

"Critical mindedness is a major attitude in a society of free men. Unfortunately, the attitude is found associated only with habits of good thinking. Society today is suffering from a sort of intellectual scurvy. This disease is a deficiency disorder resulting from a restricted intellectual diet. It is not cured as easily as is the physiological variety of scurvy which may be corrected by the administration of a few pills containing the necessary amount of ascorbic acid. Habits of thought and intellectual outlook are not changed by taking pills but can be corrected only by a process involving education. Along with your scientific training in biology you should assume some responsibility for aiding in this education to correct this very serious disorder of our society.

We are very proud of the democracy in which we live because it permits us to do as we like. But when we talk about doing as we please I am reminded of Professor Huxley's statement that, 'A man's worst difficulties begin when he is able to do as he likes.' To preserve our democracy we must want to do what is right for our society. It must be a matter of vital concern to all our people, but especially to our elected agents in government, to realize that the conduct of practical affairs should be guided by the scientific method, that is, by critical examination and evaluation of experience rather than by raw emotion, vested authority, or wishful thinking. You must be scientific missionaries to your community. Only by promulgating the scientific attitude can we be sure of preserving democracy.

The scientist moves with perfect freedom toward truth wherever the path may lead. No authority can stay him; no tradition perplex him; no dogma, no prejudice, no vested interest prevent the exploration of what he sees. Scientists who are free all speak the same great language of ideas.

Science cannot be prejudiced. Skin color, religion, politics have no standing in the laboratory. The scientist in biology knows there is no Aryan zoology, no Jewish bacteriology, and no Bourgeois genetics. Science judges ideas solely for themselves and never asks what company they keep.

Take your biological training into your everyday living and you will find it to be a culture to enrich your life, and enlarge and refine life's satisfactions. Also, you will have done much for the preservation of our democracy for the good of all of us."

ALPHA RHO

—University of Arkansas

President—George Zimmerman, Box 129 Gregson Hall, Fayetteville, Arkansas.

Vice-President—Jerry Shaw, Apt. 14 U-Ark Courts, Fayetteville, Arkansas.

Corresponding Secretary—John Jackson, 241 Buchanan St., Fayetteville, Arkansas.

Recording Secretary—Lee Parker, Box 129 Gregson Hall, Fayetteville, Arkansas.

Treasurer—Harry Statman, 763 W. Dickson St., Fayetteville, Arkansas.

Editor—Walter Harman, 617 Ida Street, Fayetteville, Arkansas.

Graduation left us with a small group of active members this year, but twenty-six new ones were initiated, and now we have the membership back to normal and an active chapter once again.

At each of the regular meetings topics of interest to the members are presented. Professor M. R. McClung presented at our last meeting a paper on the inheritance and physiology of the Rh factor. Dr. Harold M. Hefley, Professor of Zoology, will show kodachromes at the next meeting of particular interest to the Ecologists. He made these while teaching at the Rocky Mountain Biological Laboratories this summer. A banquet and guest speaker are to highlight our entertainment for the semester.

We are happy to extend a welcome to new members from other chapters. Dr. Perry M. Johnston and Miss Louise Russert come to us from the Beta chapter at the University of Michigan and Dr. J. A. Sealander comes from the Rho chapter at the University of Illinois.

Recently the by-laws of the Alpha Rho chapter were revised and the requirements were elevated to insure a better qualified and more interested membership.

The new initiates are: Perry Lee Adkisson, Lowell T. Lankford, Adlai F. Arnold, Robert Sale Ayres, Jr., Bobby Dale Barnett, Emery Brown, James W. Buice, Barbara Perkins Carson (Mrs. Edwin), Stanley Nelson Elson, Donald Edward Farris, William Sparlin Ferguson, Walter James Harman, Seth E. Henry, Lewis Edward Hershberger, Joseph Ogden Legg, Carl Edwin Lueker, Douglas H. Lowrey, Edward U. Mitchell, Constance Pinkerman, Dennis Grant Rainy, Virgil Reading, Jerry Milton Shaw, Robert Otis Talbert, Howard Weinstein, Ernest M. Weitz, and George E. Zimmerman.

ALPHA SIGMA

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Vice-President — Helen Ponewczynski, 111 W. 19th, Austin, Texas.
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Recording Secretary—Nelda Ray Neyland, Rt. 5, Box 149, Austin, Texas.
Treasurer—Rex Hocker, 505 W. 18th, Austin, Texas.
Editor—Mary Lou Jeffery, 2311 Longview, Austin, Texas.

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Editors—M. and Y. Amrein, c/o Zoology Dept., U.C.L.A.

ALPHA PHI

—College of Puget Sound

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Corresponding Secretary—Robert C. Johnson, Biology Dept., College of Puget Sound, Tacoma 6, Wash.
Recording Secretary—Aldon Peterson, 8120 Vets Dr., S. W., Tacoma, Wash.
Treasurer—Dr. Murray Johnson, Medical Arts Bldg., Tacoma, Wash.
Editor—James Caillouette, 10205 Lk. Steilacoom Dr., Tacoma, Wash.

ALPHA CHI

—University of the Philippines

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Vice-President—Joventino D. Soriano, Dept. of Botany, Coll. of Lib. Arts, Univ. of the Phil.
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Editor—Paz Reyes Angeles, Dept. of Botany, Coll. of Lib. Arts, Univ. of the Phil.

Dear Dr. van der Schalie:

I suspect that you are thinking that I have been rather irresponsible in the matter of reporting to you the results of the installation of the Alpha Chi chapter of Phi Sigma Society of the University of the Philippines on March 12 of this year. I have, however, a fairly good reason in that the schoolyear at the University closed a week after the installation and most of the society officials disbanded and left this vicinity for the summer (April, May and June). I also left shortly thereafter to attend the meeting of the Indo-Pacific Fisheries Council in Singapore and was gone for three weeks and it was not, therefore, until recently that I managed to verify my notes to enable me to write to you a report that would be suitable for presentation at the National Convention should you so desire.

The installation was held in the afternoon of March 12 in the temporary building of the University at its new location in Diliman, Quezon City, which is about eight miles northeast of Manila. The installation was held in the Gregory Terrace reception hall (formerly officers club of the headquarters of the Philippine-Ryukyus Command, U.S. Army). The installation went very smoothly. We were very fortunate in being able to have had two rehearsals before hand and thus, not a single untoward incident occurred. We were favored by the presence of a considerable list of Phi Sigma members from various universities and colleges in the U.S. who now reside in

This is why the University of the Philippines has moved out to Diliman, Quezon City. The Japanese had fortified the University buildings and had to be bombed out. There wasn't much left when the Editor of the Biologist took this picture, in March 1945.

the Philippines. All of the newly elected Phi Sigma officers and the sponsors carried out their parts in the ceremony in meticulous fashion.

Following the installation ceremonies in the afternoon, the chapter and guests assembled in the dining hall of the same building in the evening for the installation banquet. This occasion was marked by an address by the president of the university, a geneticist, Dr. Bienvenido Gonzalez. The installing officer was called upon, of course, to address the group concerning the background of Phi Sigma and felt himself particularly fortunate in that he could bring his personal knowledge of most of the officers into his remarks. He was proud to say that he knew Dr. Ortenburger, Stuart, Lagler and had spent one entertaining evening with Keefe. Altogether it was a memorable occasion and one the installing officers was proud to have had a part in. It was a pleasure and an honor to be invited to participate in this affair by the society.

For the information of the organization I would like to say that the Philippine university, its faculty and students are very proud to have its biological society enrolled in the Phi Sigma Society. It is one of the two honorary societies now in existence in this country. Its ideals even now are serving as a stimulus to research of high quality in the biological sciences in this nation. The Philippines have a tradition, dating back to the early days of the American occupation, of fine biological research and biologists here look upon the installation of a chapter of Phi Sigma as a recognition of the quality of this work. They are looking forward to even greater achievements in this field and to the cementing of the already firm cultural and academic relations that have existed between the two peoples for now fifty years.

Kindly convey my regards to the officers and members of the Society and thank them on my behalf for an opportunity to serve both the Society and the new Philippine Republic.

HERBERT E. WARFEL
In-charge
Biological and Oceanographic Investigations
Philippine Fishery Program

ALPHA PSI

—Virginia Polytechnic Institute

President—Samuel J. R. Gamble, Biology Dept., V.P.I., Blacksburg, Virginia.
Vice-President—Robert O. Williams, Box 4624, V.P.I., Blacksburg, Virginia.
Corresponding Secretary—Thomas B. Hutcheson, Jr., Box 86, Blacksburg, Virginia.
Recording Secretary— ....
Treasurer—Wayland W. Rennie, Box A-601, V.P.I., Blacksburg, Virginia.
Editor— ....
Council Representative—Prof. Fred S. Orcutt, Dept. of Biology, V.P.I., Blacksburg, Virginia.

BLACKSBURG, May 24—A chapter of Phi Sigma, national honorary biological fraternity, was installed at Virginia Tech as ceremonies were completed here tonight.

Dr. A. I. Ortenburger, national chancellor of the fraternity, and of the department of zoology at the University of Oklahoma, and Dr. Henry van der Schalie, national executive secretary of the fraternity, and of the museum of zoology at Ann Arbor, Mich., flew here this morning and presented the charter to the group this evening.

Installation service was held at 6 p.m. and a banquet followed at 7 tonight in Tech's faculty center.

Dr. van der Schalie reports the event as follows:

On May 24, 1948, the Alpha Psi chapter was installed at Virginia Polytechnic Institute. This school had a biology club known as Biotech which was organized in 1939. Conditions during the war years made the suspension of its activity necessary. In the fall of 1948 a number of graduate students interested in biology brought about a reactivation Biotech. This same group of students petitioned for membership in Phi Sigma.

Several faculty members who were members of Phi Sigma at other institutions served as acting officers, as follows: F. S. Orcutt, a member at the University of Wisconsin (Zeta) was acting President; H. S. Mosby, of the University of Michigan (Beta) chapter was acting Vice-President; R. E. Towne, a member of the University of New Hampshire (Phi) chapter was the acting Secretary; and H. L. Dunton, a former member at Michigan State College (Theta) served as acting Treasurer. Forty-three active members were initiated. It was a pleasure to have the head of the Biology Department, Dr. I. D. Wilson, initiated as the first faculty member in this new chapter. The new officers installed are the following: Samuel J. R. Gamble, President; Robert O. Williams, Vice-President; Thomas B. Hutcheson, Jr., Secretary; and Laurie E. Rennie, Treasurer.

Other charter members include: Joseph A. Barlow, Smithfield; Miles G. Bowles, Sabot; James M. Adams, Cleveland, O.; James M. Bacos, Brooklyn, N. Y.; Charles E. Buckley, Charleston, W. Va.; Mitchell A. Byrd, Franklin; Marshall R. Cammack, Buhl, Ida.; Edwin L. Cox, Moncton, N. B., Canada; Joseph M. Crockett, Wytheville; Flora P. Day, Blacksburg; Arthur W. Dickson, Amityville, N. Y.; James W. Engle, Jr., Cambria; Lloyd L. Goulder, Jr., Petersburg; Mary Jo Jackson, Bluefield, W. Va.; Kelvin D. Kable, Port Washington, N. Y.; Dendall W. King, Scarsdale, N. Y.; Robert C. Kluge, Portsmouth; Curtis F. Marks, So. Norfolk; Rowland L. Miller, Harrisonburg; Glenn R. Noffsinger, Fincastle; Neala Jan Nordstrom, Arlington; Walter S. Overton, Farmville; and Charlie L. Perkins, Jr., Portsmouth.

W. Emmett Jefferson and Leighton A. Nutting, both of Oak Ridge, Tenn.; Mary L. Pettinger, Blacksburg; James G. Plackis, Flushing, N. Y.; John Rebman, Richmond; Laurie E. Rennie, Richmond; Linvil G. Rich, Oak Hill, W. Va.; Robert D. Richards, Blacksburg; Dean A. Rosebery, Stahl, Mo.; Willis C. Royall, Jr., Salem; Oh Sien Shen, Blacksburg; Walter J. Stanford, Galax; Fred W. Tylec, Meriden, Conn.; Peter H. Watkins, Cambria; John W.

Reading left to right: Dr. Fred S. Orcutt, Thomas B. Hutcheson, Jr., Samuel J. R. Gamble, Dr. Henry van der Schalie, Robert O. Williams, Dr. I. D. Wilson, Dr. A. I. Ortenburger, and Laurie E. Rennie.

Watson, Richmond; William C. White, Amelia; and Robert O. Williams, Arlington.

Following the installation ceremony a banquet dinner was held. Dr. F. S. Orcutt served as toastmaster. After dinner he spoke briefly about the wholesome interest of the students at Virginia Polytechnic Institute in a biological society. He stressed the desire of the group to become affiliated with Phi Sigma and to share the fellowship of that society. One of the group who had worked particularly industriously towards this end was the President of the Biotech Club, Linvil G. Rich, who spoke briefly. He emphasized that there was splendid cooperation and a fine spirit of fellowship among the members of the Biotech Club. He said that he felt Biotech had come of age and that the local group could maintain its vigor while it contributed to the society with which it now becomes affiliated. The several staff members who were members of Phi Sigma at other schools then expressed their interest in the new chapter and extended their good wishes for the success of Alpha Psi.

The speaker of the evening was the Vice-President of the school, Dr. C. C. French. He called attention to some basic changes taking place in science as a whole. This concept was forcibly brought home to him through a visit to the atomic energy plant at Oak Ridge, Tennessee. Formerly science was concerned mainly with results alone and scientists were apt to be inhabitants of the "ivory tower" in the true sense. In contrast, the work at Oak Ridge is a striking indication of the ramifications of several fields as well as a demonstration of the tremendous consequences such work has in the world in which we live. These developments stress the necessity for scientists to appreciate fully the consequences of their efforts. Responsibility must be assumed and scientists should be prepared to accept this trust.

Both Dr. Ortenburger and I were much impressed with the fine spirit of both the staff and the newly initiated members at the Virginia Polytechnic Institute. We have genuine confidence in this group and are pleased to welcome them to the fellowship of our society.

Membership Record, 1948-1949

Name of Chapter	School	Number Initiated 1948-1949	Total Membership	Inactive since
*ALPHA	Ohio State University	0	111	1925
BETA	University of Michigan	63	1,216	
*DELTA	University of Maine	0	281	1934
EPSILON	University of Denver	24	344	
ZETA	University of Wisconsin	33	893	
ETA	University of Akron	5	235	
*THETA	Michigan State College	0	303	1936
*IOTA	Washington University	0	389	1938
KAPPA	University of Kansas	50	709	
LAMBDA	University of Montana	23	567	
*MU	University of California	0	1,060	1944
NU	Washington & Jefferson	21	318	
*XI	University of Nebraska	0	243	1935
*OMICRON	University of N. Dakota	0	54	1928
PI	Emory University	54	332	
RHO	University of Illinois	67	624	
SIGMA	University of Florida	63	378	
*TAU	Duke University	0	234	1942
UPSILON	Miami University	41	795	
PHI	University of New Hampshire	21	654	
CHI	Montana State University	20	276	
PSI	University of Washington	40	640	
OMEGA	University of Oklahoma	39	520	
ALPHA ALPHA	Univ. of Southern California	0	407	
ALPHA BETA	Mount Union College	32	418	
*ALPHA GAMMA	Univ. of South Dakota	0	53	1931
*ALPHA DELTA	Lawrence College	0	60	1935
ALPHA EPSILON	University of Pittsburgh	27	427	
*ALPHA ZETA	College of William & Mary	0	155	1938
ALPHA ETA	Oklahoma A. & M.	59	542	
*ALPHA THETA	Washington State College	0	365	1943
ALPHA IOTA	Bucknell University	29	196	
ALPHA KAPPA	Hunter College	13	398	
ALPHA LAMBDA	University of Utah	32	297	
ALPHA MU	University of Oregon	25	387	
ALPHA NU	University of New Mexico	24	223	
ALPHA XI	Rhode Island State College	29	276	
ALPHA OMICRON	Marquette University	26	236	
ALPHA PI	University of Colorado	22	130	
ALPHA RHO	University of Arkansas	57	125	
ALPHA SIGMA	University of Texas	25	429	
*ALPHA TAU	National Univ. of Mexico	0	17	1947
ALPHA UPSILON	University of California	51	178	
ALPHA PHI	College of Puget Sound	13	37	
ALPHA CHI	University of the Philippines	40	40	
ALPHA PSI	Virginia Polytechnic Institute	44	44	
	TOTAL	1,112	16,616	

* Inactive

American Association for the Advancement of Science

The American Association for the Advancement of Science, founded in 1848, and meeting with its Affiliated and Associated Societies in New York City, December 26-31, 1949, is the only national body representative of all the sciences. With its 211 affiliated and associated societies (A X Σ is associated with the AAAS) and state academies of science, it is by far the largest and most influential scientific organization in the world. These affiliates are grouped into seventeen sections and subsections—from A-Astronomy to Q-Education—each administered by a committee of six including chairman and secretary in addition to representatives of societies affiliated with the section. The Association has about 45,000 individual members most of whom elect to receive either *Science*—a weekly journal primarily for technical scientists; or *The Scientific Monthly*—an authoritative less technical treatment of progress in science.

(A member may receive both publications at a special combination rate by adding $3.50 to the annual dues of $6.50.) About one quarter of the membership have become fellows through their scientific contributions and attainments.

The AAAS seeks not only to further cooperation among scientists in all the diverse fields but also it is increasingly concerned with the improvement of human welfare and in a better public understanding of the interrelations of science and human progress. The sections are broad enough to include not only all professionally trained scientists who appreciate the place of science in our contemporary civilization but any person interested in science who wishes to keep informed, and who is concerned with the proper integration of science and human society. With great governmental research agencies on the increase and impending social legislation with scientific aspects, more than ever a strong, unified scientific association, representative of the clearest thinking in science is needed.

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"The object of Phi Sigma is to promote interest in biological research. Although always designated as an honorary biological research society, it should be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts

1915	March 17, Alpha Chapter organized, Ohio State University, Columbus.
1916	May, Central Governing Body organized, BIOLOGIST first issued.
1917	June, last War-time BIOLOGIST issued.
1921	February, BIOLOGIST revived.
1924	December, First National Meeting, Constitution revised, Washington, D. C.
1925	December, Second National Meeting, First Science Program, Kansas City.
1926	December, Third National Meeting, Second Science Program, Philadelphia.
1927	December, Third Science Program, Nashville.
1928	December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
1930	January, Council Meeting, Ritual Revised, Norman, Okla. December, Fifth National Meeting, Fifth Science Program, Cleveland.
1931	Phi Sigma Letters Registered, U. S. Patent Office.
1932	December, Sixth Science Program, Atlantic City.
1933	June, Sixth National Meeting, Seventh Science Program, Chicago.
1935	December, Seventh National Meeting, Eighth Science Program, St. Louis.
1937	December, Eighth National Meeting, Ninth Science Program, Indianapolis.
1939	December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
1941	December, Tenth National Meeting, Dallas, Texas.
1946	December, Eleventh National Meeting, Boston, Mass.
1948	December, Twelfth Meeting, Eleventh Science Program, Albuquerque, N. Mex.

The Constitution provides that: "A new active chapter may be established in any four-year degree-granting college or university . . . which is equipped with facilities for research in biological sciences to such an extent that at least one degree beyond the baccalaureate may be earned from that institution for biological research pursued there."